Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

m and i

MICANITE & INSULATORS CO. LTD. EMPIRE WORKS, BLACKHORSE LANE, WALTHAMSTOW, LONDON. E.17

thermoplastics?

...let's ask BX

"First get the facts right!" That is an obvious measure, and when dealing with an Industry too young to have assembled all its data on paper, the conclusion is obvious; consult experience.

We, at BX, don't pretend to know *all* the answers but we started in 1877 and have since attained the most comprehensive coverage of development and production in thermoplastics. The store of knowledge and experience thus gained we now put freely at your disposal.

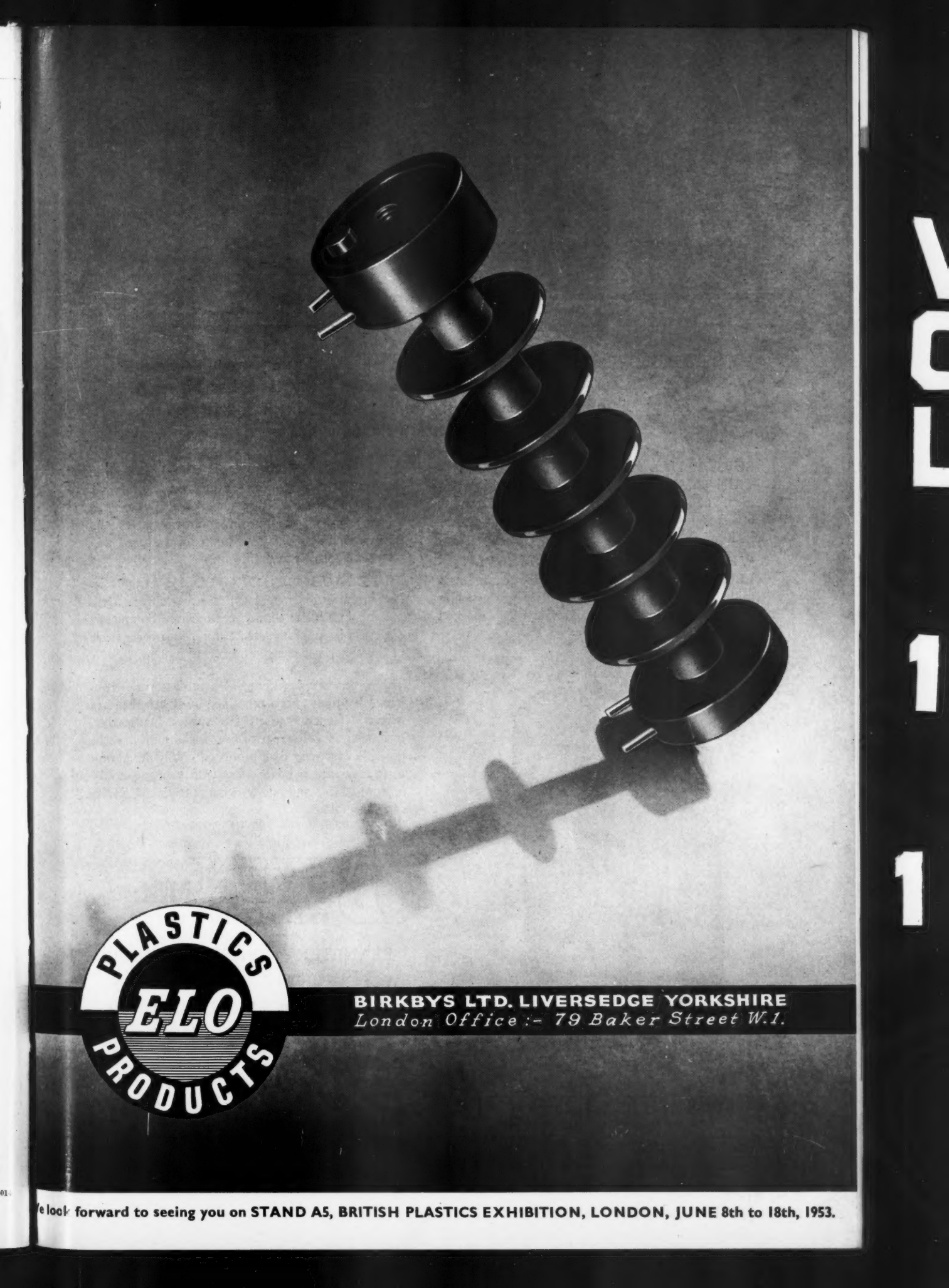
Here, for example, are three recent research projects successfully carried out with customers. A pocket refill for tractor grease-guns made from Velbex flexible P.V.C. sheet. Wear-resisting, attractive upholstery in Tygan, woven from our Saran yarn, for convertible freight/passenger aircraft. Chemical pickling cabinet made entirely from Cobex rigid vinyl sheet and extrusions.

"Ask BX" is, in fact, the first practical and helpful bit of advice we can give you.

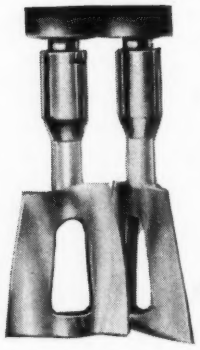
BX PLASTICS LTD., Higham Station Avenue, London, E.4. *Tel: LARkswood 5511*

Visit BX Plastics Stand No. B10 at the British Plastics Exhibition, Olympia June 8—18

T.A. 501


PLASTICS
ELO
PRODUCTS
BIRKBYS LTD. LIVERSEDGE YORKSHIRE
London Office :- 79 Baker Street W.1.
We look forward to seeing you on STAND A5, BRITISH PLASTICS EXHIBITION, LONDON, JUNE 8th to 18th, 1953.

How can the TRUE MIX assist your production?



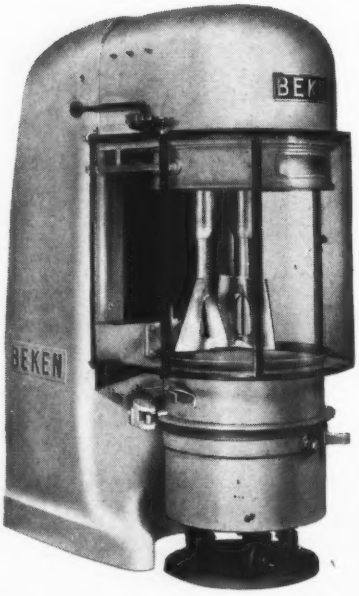
BEKEN Planetex Vertical Mixers have enabled many manufacturers to process their materials more economically than has hitherto been possible and with surprising improvements in the quality of the product. Among many examples are the following :—

SUBSTANTIAL REDUCTIONS IN PRODUCTION TIMES. Emulsion paint comprising pigment and emulsion completed in 20 minutes; asbestos powder or short fibres mixed with cement in 10 minutes.

WHOLE PRODUCTION STAGES ELIMINATED. Pyrotechnical compounds hitherto milled after mixing now completely processed in mixer in one-third of the usual time, with a marked improvement in quality.

ACCEPTED LIMITATIONS REMOVED. Stiff doughs, light pastes and even powders are all mixed with an efficiency unequalled by existing mixers; smooth creams and uniform pastes and doughs obtained free from lumps or balling; performance consistently uniform.

FINAL PRODUCT IMPROVED. P.V.C. plasticised more rapidly and uniformly than hitherto possible in a mixer alone; cotton fibre completely dispersed in cellulose acetate dope—searching tests of the mixer's efficiency and versatility!



These are examples of actual manufacturing problems which have been simplified by Beken Planetex Mixers. Generalisations are always inadvisable, but what is being performed for others may be possible with your own products. Why not permit us to carry out a mixing test with your materials, in confidence, and show what TRUE MIXING can save you.

THE BEKEN MIX is the TRUE mix

"PLANETEX" VERTICAL MIXERS
Sizes from 5 to 100 gallons

"DUPLEX" HORIZONTAL MIXERS
Sizes from 155 c.c. to 500 gallons

Sole Distributors :

LAVINO (LONDON) LIMITED

103, Kingsway, London, W.C.2. PHONE : CHANCERY 6137

Sole Makers :

E. HUNT & CO. LIMITED

Ripple Road, Barking, Essex. PHONE : RIPPLEWAY 1444

B&T

HYDRAULIC PRESSES

For Compression Moulding

In sizes up to 1,000 *tons capacity*

THIS range of self-contained presses has been developed to meet the needs of manufacturers who want a press with its own pump unit, and only requiring the electrical connection to be made for starting up.

The motor-driven pump unit is mounted integrally on top of the press, thereby saving floor space.

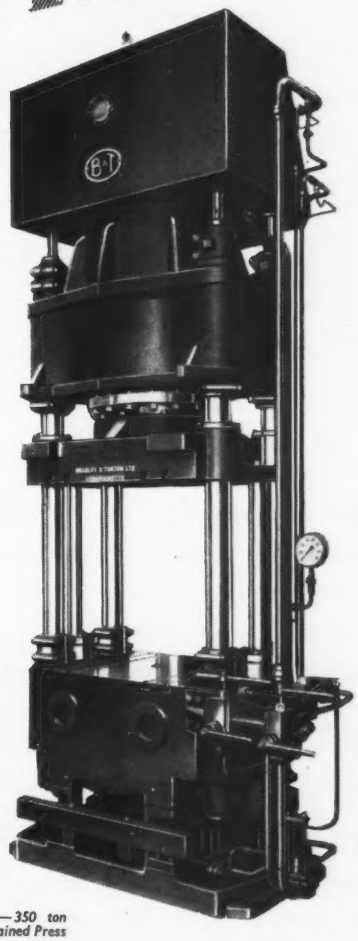
The working pressure is easily adjustable to provide a choice of varied moulding pressures.

Hydraulic operated prefiller valves are fitted to give fast approach and return strokes.

Control is by simple easily maintained screw-down type valves.

Independently controlled bottom-ejector gear is incorporated with provision for semi-automatic top ejection.

Electric- Steam- or Gas-heated platens can be fitted.



No. 984—350 ton Self-contained Press

See our Stand No. A.37, ground floor, British Plastics Exhibition, Olympia, June 8th—18th.

Also Manufacturers of:

HYDRAULIC PUMPS · HYDRAULIC ACCUMULATORS · PELLETING MACHINES · HYDRAULIC VALVES · AUTOMATIC MOULDING-CYCLE CONTROL UNITS

Bradley & Turton Ltd

CALDWALL WORKS KIDDERMINSTER

TELEGRAMS : " WHEELS " KIDDERMINSTER TELEPHONE : 2217/8

Birmingham Office

114, HAMSTEAD ROAD, HANDSWORTH, BIRMINGHAM, 20. TELEPHONE: NORTHERN 2519

THE LEADING MANUFACTURERS OF COMPRESSION MOULDING EQUIPMENT

Electrify production—

use G.E.C.

ELECTRIC Process Heating

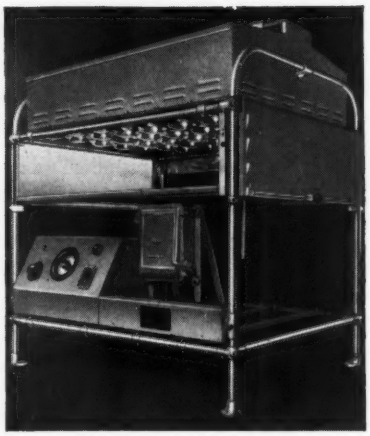
FURNACES · INFRA RED · HIGH FREQUENCY

● Bold thinking about bigger production demands new methods of heat treatment. G.E.C. *electric* process heating ensures maximum output and true economy. . The many heating equipments in its range are clean, safe, simple to operate, and heat rapidly to constant correct and controlled temperatures. Its versatility is being proved every day.

● It has unlimited applications: from glue-setting in a wood-working firm to bright annealing in heavy industry. For example, in the Plastics industry it is widely used for thermoplastic materials, thermosetting, gellation or fusing of plastic coated fabrics, and numerous other processes.

● G.E.C. has had many years' experience in the design and construction of heating plant. The Company's specialists welcome opportunities to discuss potential uses.

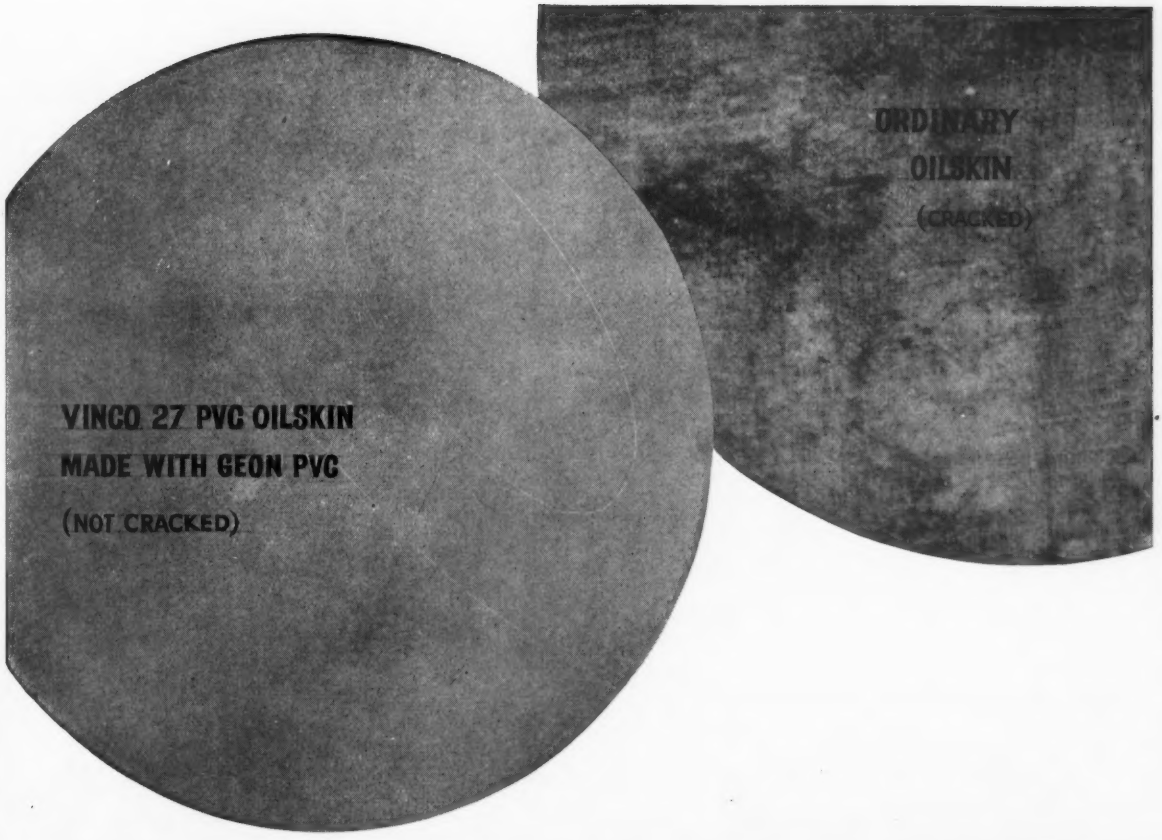
Infra-Red Heating



G.E.C. INFRA-RED LAMP PLANT can soften thermoplastic sheet prior to shaping very quickly. Because plastic sheet is semi-transparent to the radiation from lamp sources, an adequate uniform softening throughout the sheet is obtained. There is no risk of the material becoming contaminated or marked. There is no "bubbling" at the surface. Heating times vary from 2 to 6 minutes, depending on the thickness of the sheet.

● ELECTRICITY ENSURES TRUE COAL ECONOMY

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2



PVC 'OILSKINS' LAST FAR LONGER

HAVE YOU TRIED THE NEW PVC 'OILSKINS'?

A wear trial soon demonstrates the superiority of the new PVC 'oilskins', made with Geon PVC, over the conventional type made with linseed oil. The illustrations show ordinary oilskin, and Vinco 27 PVC 'oilskin' made by M. Barr & Co. Ltd. with Geon PVC, after identical use by seamen for a period of six months. The ordinary oilskin is severely cracked, whereas the PVC material is quite unaffected. PVC 'oilskins' do not crack on flexing, particularly in the sleeves.

The Geon PVC surface can withstand the roughest wear. This type of clothing is not harmed by extremes of temperature and can even be stored away wet without deterioration. Thus, 'oilskins' made with Geon PVC last much longer and also give much better service throughout their life.

Ask next time for PVC 'oilskins'.

Please write for Booklet No. 51 describing the Geon range of PVC raw materials.

BRITISH GEON LIMITED

Sales & Technical Service: 21 St. James's Square, London, S.W.1. Tel. Whitehall 9561

Geon
Polyvinyl Materials

"Geon" is a Reg'd Trade Mark

HUPFIELD Plastics

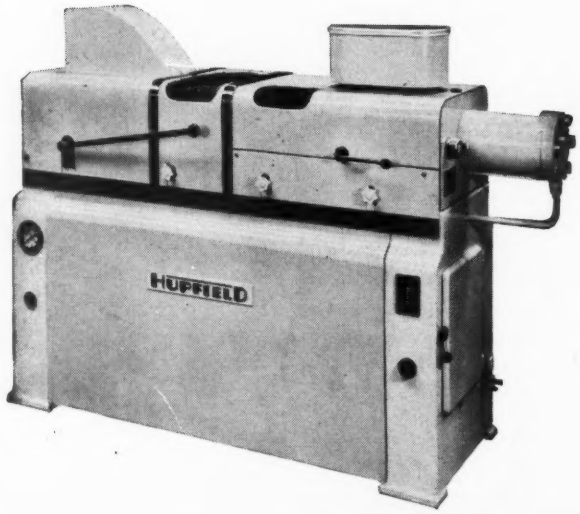
INJECTION MOULDING MACHINES

1 & 2 OUNCE CAPACITY

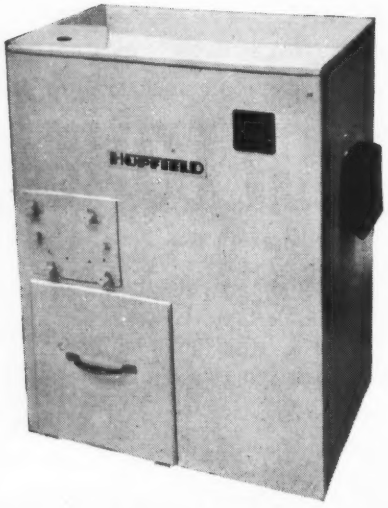
1953 MODELS

Single lever operated, semi-automatic, hydraulic machine, completely self-contained with electric motor. Fitted with a compensating feed mechanism and the latest Tem-Con automatic temperature control. The machine is economical to run and extremely simple to operate, ideal for female labour. All parts are standardised.

	1 oz.	2 oz.
Mould area approximately..	12 sq. in.	22 sq. in.
Plasticizing capacity per hour	11 lb.	22 lb.
Injection pressure	5½ tons	11 tons
Mould locking pressure ..	22 tons	44 tons
Shots per hour, subject to mould design	350	250

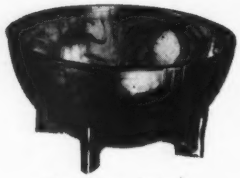


GRANULATING MACHINES

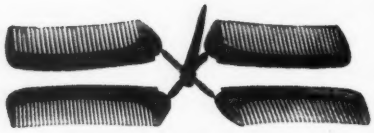


Granulates all thermoplastic materials, delivers at the rate of 80 lb. per hour. Cutting blades are adjustable and easy to clean. Completely self-contained with 2 h.p. electric motor.

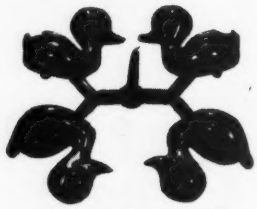
Mouldings from our 1 ounce machine



polystyrene 3¾" dia.
25 seconds. 1 ounce.



polystyrene 8" × 3½"
20 seconds. 24 gramme.



celluolse acetate 5½" × 5"
30 seconds. 31 gramme.

OLYMPIA JUNE 8-18
BRITISH PLASTICS EXHIBITION
SEE OUR EXHIBIT
STAND A2 (B)

Write for particulars, or telephone our Works (Wordsworth 4488) for a demonstration.

HUPFIELD BROTHERS LIMITED WORKS AND OFFICES
DALSTON GARDENS · STANMORE · MIDDLESEX · ENGLAND

BRITISH INDUSTRIES FAIR

APRIL 27 — MAY 8

During this period we are holding an exhibition showing a magnificent display of toys, fancy and household goods, industrial mouldings, etc., at the

PICCADILLY HOTEL LONDON, W.1

SUITES 306 & 417

TELEPHONE: REGENT 8000

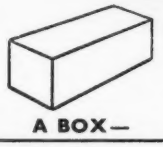
The Only

POCKET FOLDING MICROSCOPE

IN THE WORLD!

BRITISH PATENT
No. 678050

MAGNIFICATION
16x. OVER
250 AREAS



A BOX—

A TWIST —

A MICROSCOPE

The lens in this instrument is of *scratch-proof optical glass*, edge-ground for precision, and gives a wide angle of view. Focusing is by screw-thread which is exact and micrometer like in adjustment. Depth of *focus and definition* are remarkable, The correct balance of direct and reflected light on the specimen renders the magnified image clear, brilliant, and in *full colour*. The box-like structure and resilient carrying clip give complete protection to the slide when not in use. A standard 3in. x 1in. microscope slide is included. For field work, for the school, laboratory or home. *FITS THE POCKET* in *SIZE AND PRICE*. MAGNIFICATION OVER 250 areas.

THE MICROSCOPE OF THE FUTURE!

P. A. PERMUTA (PLASTICS) LTD.

Head Office: 25 BAILIFF STREET, NORTHAMPTON, *Telephone*: 4238/9

PERMANENT LONDON SHOWROOMS
Suites 306 & 417, PICCADILLY HOTEL, LONDON, W.1 · Regent 8000

Extrusions

by

Commercial Plastics Ltd.

. . . . who have pleasure in announcing that they have considerably extended their **extrusion plant** and have additional capacity available for the production of extruded plastics.

Sections for the following applications are already in production to meet customers' specific requirements.

HANDBAGS
TRAVEL GOODS
FANCY GOODS
MOTOR INDUSTRY
BUILDING TRADE
RADIO - ELECTRICAL INDUSTRIES
GENERAL ENGINEERING AND REFRIGERATION
GARDEN AND HORTICULTURAL HOSE

Commercial Plastics Extrusions are backed by the same technical knowledge and quality control that have made "Fablon" and "Superlon" names of repute in Vinyl Sheeting.

Enquiries from all industries for work of this nature will be welcomed and attended to by our specialist staff.

Please Write or telephone to:

COMMERCIAL PLASTICS LIMITED

1-9 HILL'S PLACE, OXFORD STREET, LONDON, W.1. Telephone GERrard 3966/7/8

THE DOWDING AUTOMATIC *FAST-CYCLING*

INJECTION MOULDING MACHINE

Phenomenal Demand— Extends Manufacturing Programme!

- 1,200 CYCLES PER HOUR
- FULLY AUTOMATIC AND FOOLPROOF
- FAST PLASTICIZING AT UNUSUALLY LOW INJECTION PRESSURE
- AUTOMATIC LUBRICATION
- 3-ZONE CYLINDER HEATING
- VICKERS HYDRAULIC EQUIPMENT

BRITISH MADE

EARLY DELIVERY

Visit our Stand No. D211/112 B.I.F. Castle Bromwich

SPECIFICATION

MACHINE CYCLES PER HOUR (Max.)	1,200
APPROXIMATE WEIGHT OF MATERIAL PLASTICIZED PER HOUR (Dependent upon weight per shot and material used)	22 lb.
Area of Injection plunger	2·074 sq. in.
Pressure per square inch on material at end of plunger	9,100 lb.
Total pressure on Injection plunger	18,850 lb.
Mould opens (adjustable)	9 in.
Maximum die space	7 in.
Minimum die space	3 in.
Maximum recommended casting area in mould	15 sq. in.
Size of die plates	16 × 10 in.

DOWDING & DOLL LTD GREYCOAT STREET, LONDON, S.W.1

TELEPHONE: TATE GALLERY 9431 (10 LINES) TELEGRAMS: ACCURATOOL SOWEST LONDON

Three kinds of exclusive finishing materials are now available generally

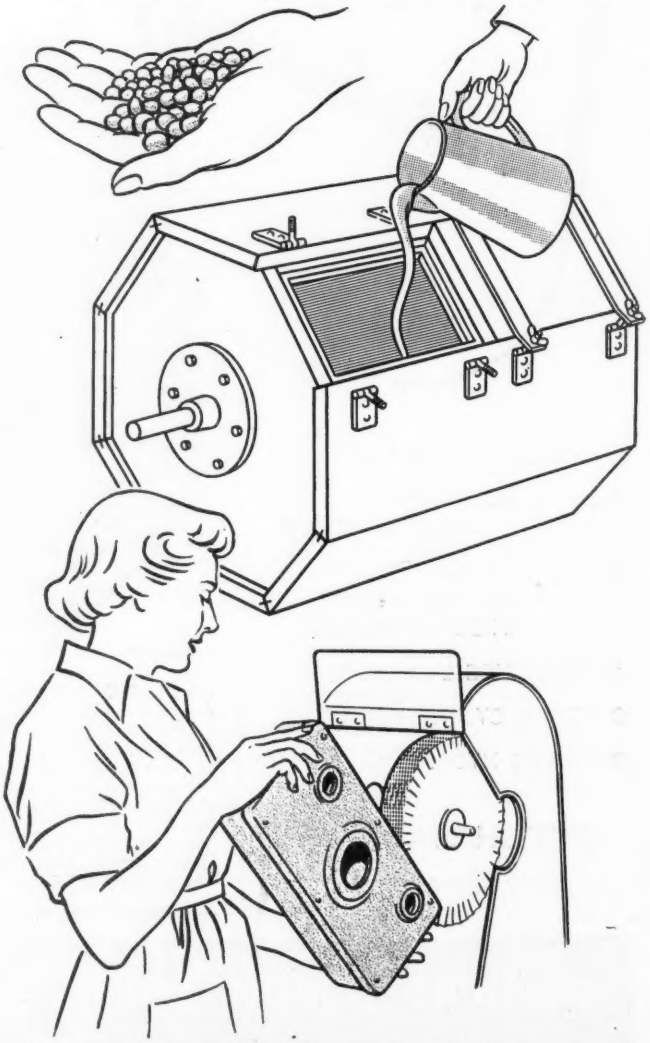
In the course of the past twenty five years, Lacrinoid have been developing certain materials for the polishing and finishing of their own products. Three of these materials, which by long test have proved outstandingly good, are now made available to manufacturers in general.

FINISHING GRANULES
for the barrel surfacing of plastics, wood and metal parts. The granules are of porous stone impregnated with a special bonding and lubricating compound. Their use prevents formation of dust and protects the material from abrasions. The granules can be reimpregnated after a period of use.

POLISHING CREAM No. 10
for the barrel polishing of small and medium sized plastics objects. A lasting, brilliant lustre is imparted with great speed and with the very minimum of supervision.

BAR POLISH No. 11
performs simultaneously the functions of (1) abrasion, (2) finishing and (3) glossing. It is fast in action and not only saves time but results in considerable economies in the replacement cost of mops.

Apply for descriptive leaflets which give fuller details of above materials.



LACRINOID

TRADE MARK

The services of the Lacrinoid Research Department are freely offered in any development of finishing and polishing techniques.

See our stand No. A24 at the Plastics Exhibition at Olympia June 8-18

LACRINOID PRODUCTS LTD., GIDEA PARK WORKS, STAFFORD AVENUE, GIDEA PARK, ESSEX. Tel: Hornchurch 2981

FOR YOUR ETHER AND CHLOROFORM REQUIREMENTS...

M&B

FOR THE MANY INDUSTRIAL PROCESSES WHERE CONSISTENTLY RELIABLE GRADES OF ETHER AND CHLOROFORM ARE REQUIRED, WE PRODUCE THE FOLLOWING:

CHLOROFORM

B.P.

ETHER

B.P. *and* **B.S.S. 579**

BULK SUPPLIES OF ETHER ANHYDROUS TECHNICALLY PURE ARE ALSO AVAILABLE

Enquiries to manufacturers:

MAY & BAKER LTD

DAGENHAM ENGLAND

Telephone: ILFord 3060 Extension 219

Associated Houses: BOMBAY · LAGOS · MONTREAL · PORT ELIZABETH · SYDNEY · WELLINGTON

Branches and Agents throughout the World

IA223

We figured it out for National

The National Cash Register Company (Manufacturing) Ltd., Dundee, wanted key tips for their world-famous adding machines meeting the following requirements: Keys must be able to withstand all types of climatic conditions; they must be produced in large quantities, economically; the identifying numerals must remain neat and clearly visible throughout their life. National Cash entrusted the job to Ekco Plastics—a tribute of which we are justly proud. The finished article more than meets the exacting conditions laid down and is another fine example of what a comprehensive "under-one-roof" service can achieve. Whatever *your* plastic problem—Thermosetting or Thermoplastics—Ekco is ready to tackle it swiftly and skilfully. Next time—consult Ekco!

Technically the following points are interesting: Key tips were moulded in Cellulose Acetate Butyrate on two 4 oz. injection machines. Moulding was carried out in two stages—the outer shell being moulded first, the numeral (a solid core in a contrasting colour) then being moulded into the outer shell. This operation ensures a numeral which resists wear—and which therefore retains its readability indefinitely. Flash lines were removed and a semi-gloss finish acquired by "rumbling."

...then we figured it in!

EKCO *Plastics for Industry*

E. K. COLE LTD. (PLASTICS DIVISION) EKCO WORKS, SOUTHEND-ON-SEA, ESSEX

Members of the British Plastics Federation

A complete range of

Polyvinyl Chloride

PRODUCTS

● **VINATEX P.V.C. COMPOUND**
FOR EXTRUSION including sheathing (dielectric and arctic grades), belting and piping.
FOR CALENDERING
FOR INJECTION MOULDING

● **VINATEX P.V.C. PASTE**
FOR LEATHERCLOTH coated paper and casting. Special grades for low temperature flexibility and non-tacky finishes. Supplied pigmented or clear.

● **VINATEX P.V.C. SHEETING and LEATHERCLOTH**
P.V.C. FLEXIBLE SHEETING and Leathercloth including press polished sheets, calendered plain or printed sheeting in all colours. Embossed supported and unsupported sheet in single or two colour effects.

VINATEX LIMITED
DEVONSHIRE ROAD · CARSHALTON · SURREY
(Wallington 9282)

Our Technical Sales Department will be pleased to advise you on your special needs.

V32

Do you buy? . . .

- *Control Knobs & Switches*

- *Telephone Equipment*
- *Radio and Electrical Components*

Complete Service

★ ★ ★

DESIGN - TOOLMAKING
MANUFACTURE - ASSEMBLY

★ ★ ★

The majority of the important Radio and Electrical concerns are already our customers. You too can benefit from our service, quality and competitive prices.

W. W. BALL & SONS LTD.

BURSTEAD WORKS • KENNEL LANE • BILLERICAY • ESSEX

PHONE: BILLERICAY 411/12

GRAMS: PLASTOOL, BILLERICAY

"I think we are getting warmer, Mr. Ash."

"Not the weather, surely, Mr. Downs."

"*No, I refer to our latest achievement in plastic refrigerator interiors.*"

"You shouldn't mention the word 'warm' when talking about refrigerators, Mr. Downs."

"*Oh, indeed I should. The new interior* 18" *x* 12" *x* 12" *is the hottest job we've done so far. It has the liner, the breaker frame, the shelf supports and the condensation return rib all in one moulding.*"

"Quite an amazing long speech, Mr. Downs. But plastics forever, say I."

"*So do our customers, Mr. Ash.*"

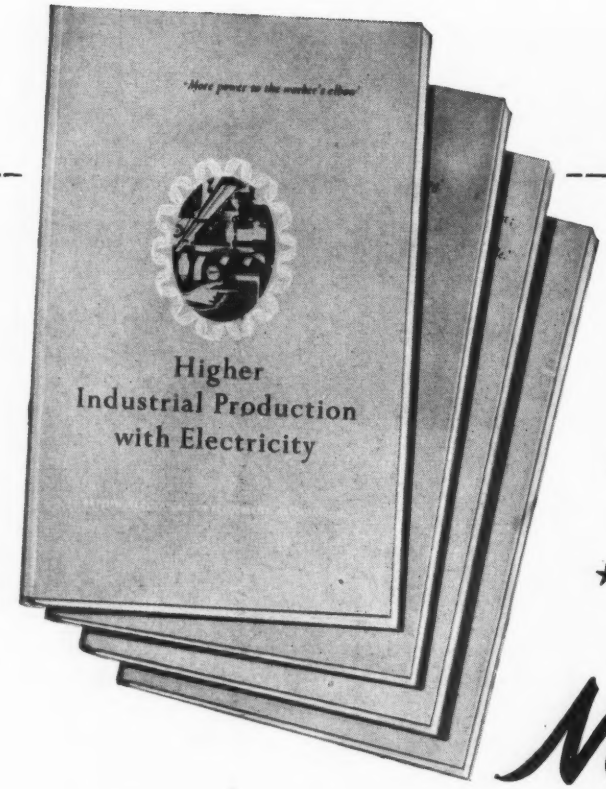
Refrigerator interior moulded in one piece from glossy white PVC.

If you want to know what Plastics can do for you

ask Ashdowns

ASHDOWNS LIMITED, ECCLESTON WORKS, ST. HELENS, LANCS.
Phone: St. Helens 3206

Ashdowns Limited is a subsidiary of Pilkington Brothers Ltd.



★ "HIGHER INDUSTRIAL PRODUCTION WITH ELECTRICITY"

★ "LIGHTING IN INDUSTRY"

★ "MATERIALS HANDLING IN INDUSTRY"

★ "ELECTRIC RESISTANCE HEATING"

New BOOKS ON Industrial Productivity

PRODUCTIVITY is one of the vital problems affecting Britain today. One way to increase productivity is to put POWER at a man's disposal; and the best way to do this is with electricity.

As a contribution to the solution of this problem, the British Electrical Development Association is now publishing a new series of books for management and executives in Industry. The first four are now available: "Higher Industrial Production with Electricity" describes a wide variety of modern production methods; "Lighting in Industry" shows how lighting can affect individual output, how its effectiveness can be assessed, and how improvements can be made; "Materials Handling in Industry" shows the way to increased productivity by improved handling; and "Electric Resistance Heating" indicates where, and how, this unique method of producing heat without combustion can be applied.

The post-free price of each of the books is 9/- and copies can be obtained from the British Electrical Development Association, 2 Savoy Hill, London, W.C.2, or from your Electricity Board.

The Association has produced a film called "A Case for Handling" which illustrates by practical demonstration the vital part that improved materials handling can play in all industries. It runs for 32 minutes, and is available on free loan.

Electricity *for* PRODUCTIVITY

at the British Plastics Exhibition 8th-18th June

The Plastics Division of I.C.I., manufacturers of the widest range of plastics in the world, will welcome visitors from home and overseas on **Stand No. 312**

In addition to the full range of plastics materials marketed by Plastics Division, Silicones will also be exhibited.

IMPERIAL CHEMICAL INDUSTRIES LIMITED, LONDON, S.W.1

EXPORT ENQUIRIES should be addressed to:
Imperial Chemical Industries Ltd., Plastics Division, Welwyn Garden City, Herts, England.
P.531

C

if it can be moulded in plastics — we will do it

We are compression and injection moulders of plastic products of every variety, size and colour.

In addition to moulding and delivering at the stipulated time articles already designed and tooled, we are especially interested in new developments. The Plastomatic Service is expert in solving novel design and production problems. It undertakes design and tooling and ensures exact confirmation to specification and mechanical principles.

It guarantees that the right material will be used and that deliveries will be made at stipulated times.

The value of our service is reflected in the number of new accounts we are opening. TRY US and . . . ! ! You should be pleasantly surprised.

PLASTOMATIC LTD

Regd. 641685 Trade Mark

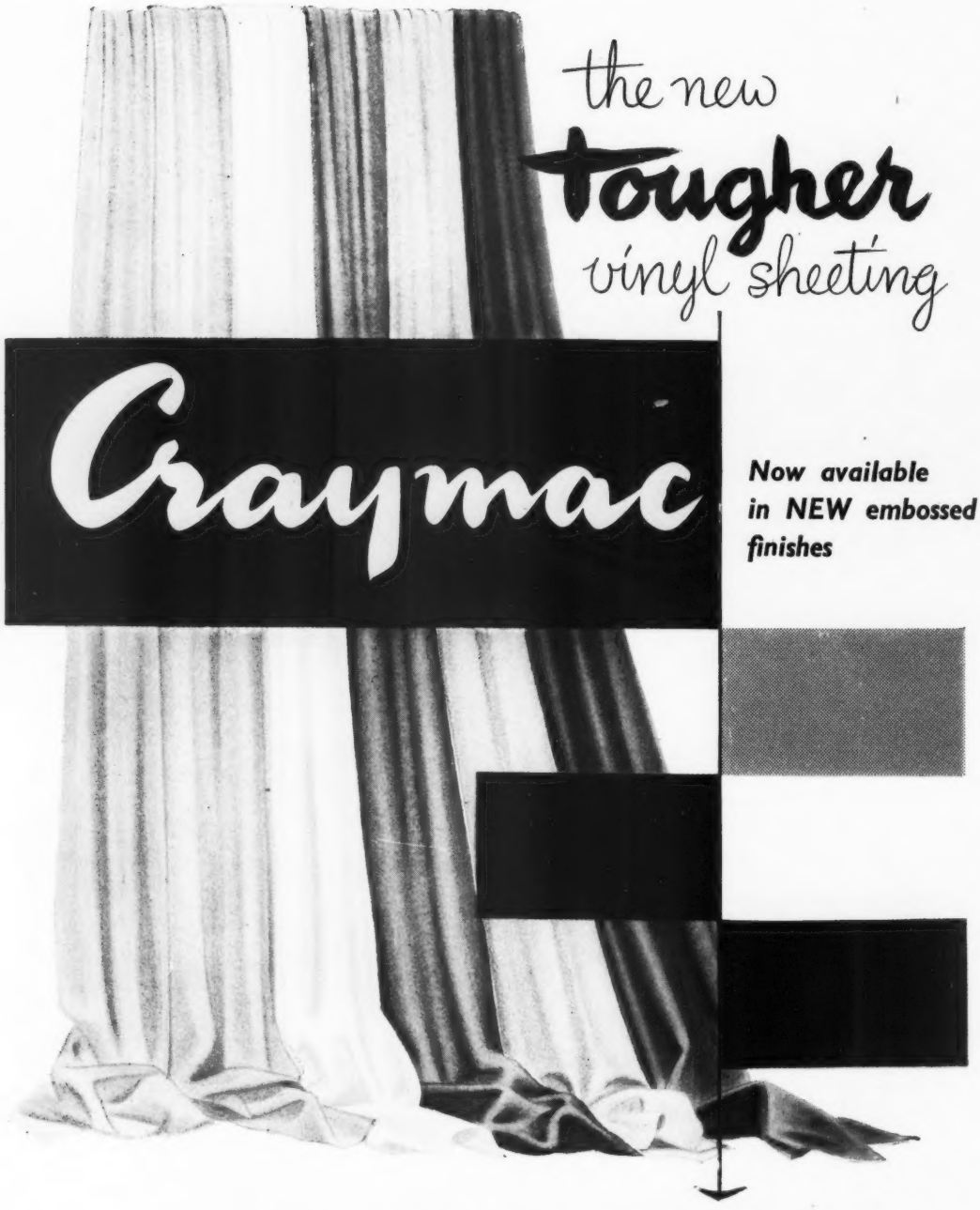
MOULDERS OF PLASTIC MATERIALS TO THE TRADE

Members of the British Plastics Federation and Contractors to H.M. Government

17, WINCHESTER RD., HAMPSTEAD, LONDON, N.W.3. *Phone : PRImrose 4463*

LET US QUOTE YOU FOR THAT JOB

Delaron REGD
LAMINATED PLASTIC
MADE BY
DE LA RUE



the new
tougher
vinyl sheeting

Craymac

Now available in NEW embossed finishes

Craymac is noted for its toughness, its soft, *silky* drape and pliability, water resistance and fast *brilliant colours*. These qualities together with its versatility are the cause of an ever growing demand for this well known vinyl sheeting. Craymac complies with the British Standards Institution No. 1763.

Serial No. 1925 BRITISH GOOD HOUSEKEEPING INSTITUTE GUARANTEES REFUND OR MONEY OR REPLACEMENT IF NOT IN CONFORMITY WITH THE INSTITUTE'S STANDARDS

THE GREENWICH LEATHERCLOTH COMPANY LIMITED ST. MARY CRAY. KENT. RAVENSBOURNE 4674-5 • ORPINGTON 5671-2-3

KNOWLES

NESTORITE
amongst "the gods"

History repeats itself. Just as Nestora, a mortal was, for his special virtues, invited by the ancient deities to visit their abode high up on Mount Olympus thousands of years ago—so his modern descendant Nestorite is, according to accurate astrological calculations, destined to be with "the gods" at the momentous event of 1953—

THE BRITISH PLASTICS EXHIBITION
OLYMPIA
JUNE 8th—18th
at STAND No. B.15
GALLERY

where Nestorite invites his many friends and customers to visit him in Olympic Heights, rest their weary bodies for a space with "the gods," receive any ambrosia needed, and gain much valuable knowledge about "the mouldings of the future."

BPF BSAC CERTIFIED

YOU'RE RIGHT WITH NESTORITE

JAMES FERGUSON & SONS LTD.
LEA PARK WORKS, PRINCE GEORGE'S RD., MERTON ABBEY, LONDON S.W.19.
Telephone MITCHAM 2283 (5 LINES) *Telegrams* NESTORIUS SOUPHONE LONDON

A. S. HARRISON & CO. PTY. LTD.,
85, Clarence St., Sydney, Australia.
120, Wakefield St., Wellington, New Zealand.
ANDRE BERJONNEAU,
134, Avenue de Villiers, Paris 17, France.
JOSE DELCLOS MOLLERA
Angel Baixeras, 39, Barcelona (2), Spain.
EINAR HOLMARK, 19, Gl. Kongevej,
Copenhagen V. Denmark.

They're lively lads at Lorival

This Cheese Core Sleeve (for textile winding) requires grooving on the outside and an undercut recess half-way down the bore, yet must be completely free of flash or burrs. A transfer injection moulding held to close limits of tolerance solved both these problems.

Our proposition, sir, is surprisingly simple. It is this! You can't be a master of every technique. Therefcre, where mouldings in plastics are concerned—leave it to Lorival. They're lively lads at Lorival! They'll give you a first-rate service: pleasing design, fine finish, keen prices, and rapid delivery. What more could you want!

LORIVAL PLASTICS

U E L

UNITED EBONITE & LORIVAL LTD · LITTLE LEVER · NR. BOLTON · LANCS.

PLASTADOR
PERFUMES FOR PLASTICS
REGISTERED
Perfumes for PLASTICS
BUSH
The colourful appearance of plastics has received great attention because of its importance as a sales aid, but little attention has so far been given to odour. Now - Plastador enters the field to impart pleasant perfume to plastics.
Where the sense of smell plays an important part in sales - as in beauty preparations, medicinal products, leather cloths, etc. - Plastador solves the problem. A wide range of subtle floral, antiseptic and other perfumes is available, each compounded after careful study of the processes involved in the manufacture and fabrication of Plastics.
Enquiries invited
Makes plastics more pleasant
W. J. BUSH & CO. LTD . LONDON . E.8 . ENGLAND

put their heads together at all stages . . .

Kolster-Brandes wanted an efficient, good-looking radio receiver case. Wisely, they came to us and, stage by stage, we worked together—right from rough sketches, at the drawing board, through the tooling and moulding. We had snags to smooth out, for it was a complex job. The curved design is unconventional, with its frets and louvres. Provision had to be made for ease of assembly of internal units—a speaker, switches, clips, etc. The result? Everybody satisfied—the customer, the public —even our Design Department people, who, as a rule, are not easily pleased.

Why not let us do the same for you?

and you'll agree—a very nice job too!

INJECTION MOULDERS *Ltd.*

WESTMORELAND ROAD, LONDON, N.W.9. Tel.: COLindale 8868/8869/8860.

TRADE MARK

1M28

Ebonestos are Proud —

that their reputation has earned for them the privilege of supplying the following world-famous undertakings with high-precision plastic mouldings :

Admiralty.
Admiralty Compass Observatory.
Air Ministry.
Electricity Boards.
General Post Office.
Ministry of Supply.
Allen West & Co. Ltd.
Arrow Electric Switches Ltd.
Artic Fuse & Electrical Mfg. Co. Ltd.
Automatic Coil Winder & Electric Equipment Co. Ltd.
British Mechanical Productions Ltd.
British Thomson-Houston Co. Ltd.
Bryce Ltd.
A. C. Cossor Ltd.
Crompton Parkinson Ltd.
Denis Ferranti Meters Ltd.
Dewrance & Co. Ltd.
"Diamond H" Switches Ltd.
Enfield Clock Co. (London) Ltd.
English Electric Co. Ltd.
Ferranti Ltd.
Griffin & Tatlock Ltd.
Hoover Ltd.
Johnson & Phillips Ltd.
K.D.G. Instruments Ltd.
Max Factor & Co. Inc.
Metropolitan-Vickers Elec. Co. Ltd.
Muirhead & Co. Ltd.
Negretti & Zambra Ltd.
Nettlefold & Moser Ltd.
New Switchgear Construction Co. Ltd.
Parmiter Hope & Sugden Ltd.
R. B. Pullin & Co. Ltd.
Reeves & Sons Ltd.
A. Reyrolle & Co. Ltd.
Ross Ltd.
Simplex Electric Co. Ltd.
Siemens Bros. & Co. Ltd., London
J. Stone & Co. (Deptford) Ltd.
The Britmac Electrical Co. Ltd.
The Horstmann Gear Co. Ltd.
The Plessey Co. Ltd.
The Strand Electric & Engineering Co. Ltd.
The Tintometer Ltd.
Trix Ltd.
J. H. Tucker & Co. Ltd.
Turnright Controls Ltd.
Vauxhall Motors Ltd.
Venner Ltd.
Westinghouse Brake & Signal Co. Ltd.
Winsor & Newton Ltd.

If it's mouldable — Ebonestos can mould it

EBONESTOS INDUSTRIES LTD.

EST. 53 YEARS

MOULDERS IN ALL PLASTIC MATERIALS AND EBONESTOS SPECIAL COMPOSITIONS

EXCELSIOR WORKS, ROLLINS STREET, NEW CROSS, LONDON, S.E.15
New Cross 2080 (20 lines)

D

B&O

25 Years Experience

Has made us

SPECIALISTS in

PHENOL FORMALDEHYDE RESINS

(powder or liquid)

for the manufacture of

GRINDING WHEELS

FOUNDRY SAND CORES and SHELL MOULDINGS

BRAKE LININGS

also

LAMINATING and IMPREGNATING VARNISHES

VALVE and LAMP CAPPING CEMENTS, Etc., Etc.

•

PLEASE SEND FOR SAMPLES AND DETAILS TO:

BLACKBURN & OLIVER LTD

MANUFACTURERS OF SYNTHETIC RESINS

LAMBERHEAD INDUSTRIAL ESTATE

WIGAN

Telephone: WIGAN 82252/3 Grams: SYNPHORM, WIGAN

By courtesy of The National Institute for the Blind and Messrs. Thermo-Plastics Ltd. of Dunstable who produce the covers in clear Polystyrene on an E.M.B. No. 9 Injection Moulding Machine.

What would you give

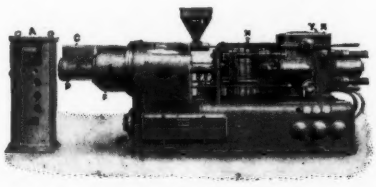
to be altogether free from troubles on your Injection Moulders?

Maybe that is impossible but on the E.M.B. No. 9 we have got maintenance problems down to the absolute minimum.

There are no complicated electrical or hydraulic gadgets needing constant attention. The result is that the machines are on the job consistently.

Ask a user!

A simple pneumatically operated machine noted for its reliability and high rate of production.



E.M.B. No. 9 Injection Moulder

E.M.B. Co. Ltd.

WEST BROMWICH ENGLAND

Resinous Chemicals Limited

RCL

invite enquiries for

SYNTHETIC RESINS

suitable for the manufacture of

MOULDING POWDERS

Enquiries to

RESINOUS CHEMICALS LIMITED
Blaydon, County Durham

Varnish media · Synthetic Resins & Glues
Moulding powders · Fine Colours · Chemicals

PHONE: BLAYDON 347-8

GRAMS: RESCHEM, BLAYDON-ON-TYNE

R1

HOT ON THE TRAIL

Are you harbouring scrap P.V.C., Cellulose Acetate, Polyethylene, Polystyrene or "Perspex"? We welcome all clues that lead us to these, or any kind of thermoplastic scrap and surplus material. Let us know the kinds and quantities you have to offer.

PLASTIC SCRAP **BERNARD CHASE**

6-8 CRUTCHED FRIARS, LONDON, E.C.3.

Telephone: ROY*al 7654 (6 lines)* *'Grams: Mulbright, London*

Sole agents in Great Britain, France and Spain for H. Muehlstein & Co. Inc., New York.

GLASS FABRIC LAMINATES

Illustration of radome we are at present producing.

We are the leading producers of Glass Fabric Laminates in this country and specialise in the manufacture of these in various grades both as standard lines and to customers own specification. We will be pleased to advise you on a suitable laminate for any application where strength and electrical or chemical resistance are of paramount importance.

19 53

27 APRIL – 8 MAY
EARLS COURT & OLYMPIA
LONDON

SEE OUR EXHIBIT

THERMO-PLASTICS LTD.

DUNSTABLE · BEDS

Telephone: DUNSTABLE 686/7/8 and 777 *Telegrams:* THERMOPLASTICS, DUNSTABLE

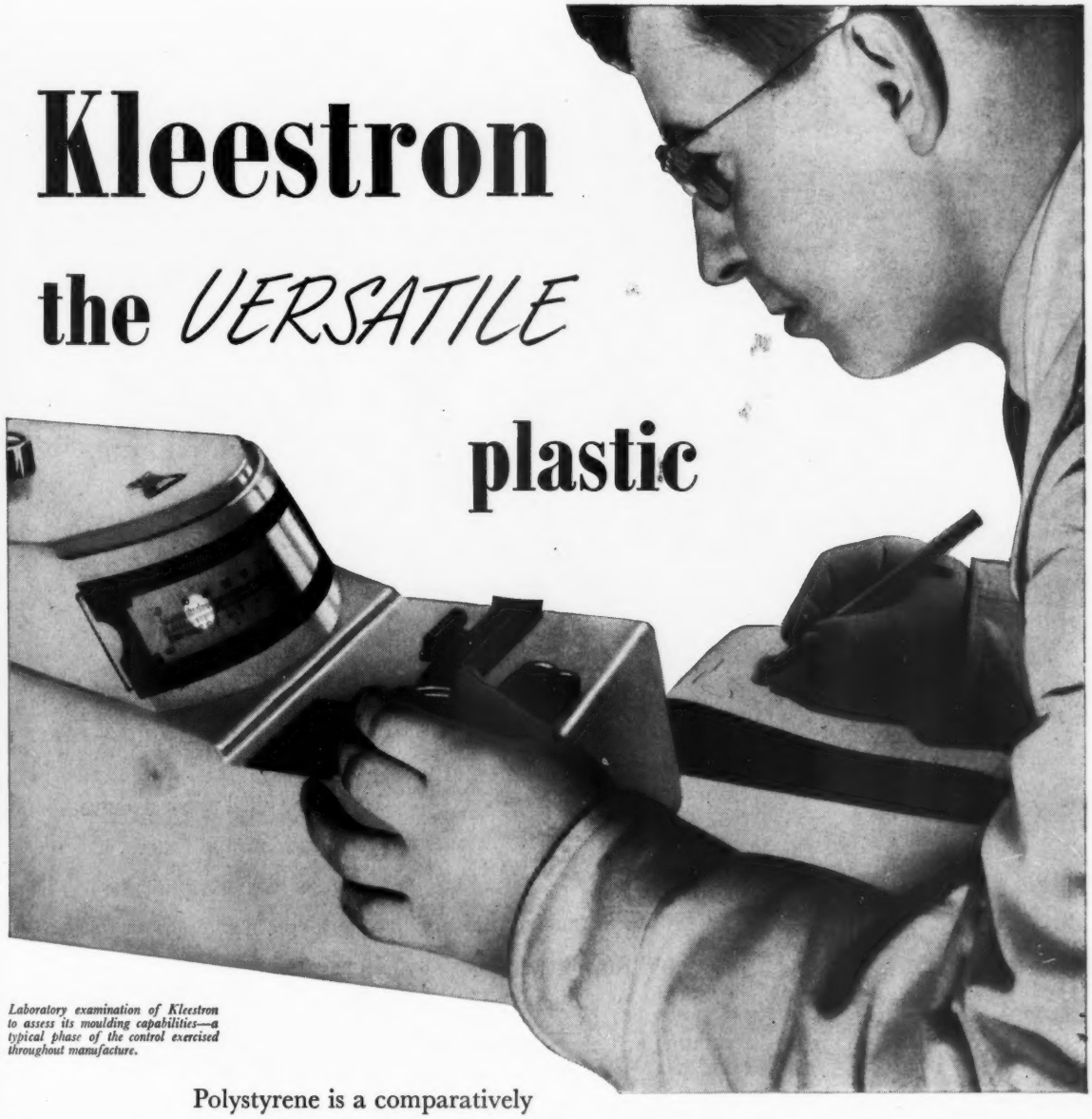
MOULDERS AND FABRICATORS OF ALL PLASTIC MATERIALS

Specialists in Perspex fabrications, glass laminates and bonding of rubber to Perspex and metal, compression and injection mouldings in Bakelite, Urea, Formaldehyde, Polythene, Polystyrene, Cellulose-Acetate, etc.

TP DUNSTABLE

Kleestron

the *VERSATILE* plastic



Laboratory examination of Kleestron to assess its moulding capabilities—a typical phase of the control exercised throughout manufacture.

★
See our exhibits at the British Plastics Exhibition Stand B.14 first floor Olympia

Polystyrene is a comparatively new word in the English language . . . but already the plastics moulding powder it identifies is renowned throughout the world for its lightness, inexpensiveness and design-adaptability. And wherever this material is discussed, there too will you hear the name Kleestron . . . the brand of polystyrene that is winning fresh laurels for versatility almost every day.

Overseas and Export enquiries to—

KLEESTRON LIMITED

WEST HALKIN HOUSE · WEST HALKIN STREET · LONDON S.W.1 · ENGLAND

Telephone: SLOane 0866 *Cables: KLEEMABRO · LONDON*

SOLE SELLING AGENTS FOR UNITED KINGDOM:
EAST ANGLIA PLASTICS LTD · 52 BROOK ST. LONDON · W.1

These new Shell products have many important applications in Industry.

For example: as SOLVENTS in the manufacture of lacquers, plastics, leathercloth and polishes; as CLEANING AND DEHYDRATING AGENTS in the photographic printing and electroplating trades.

I.P.S.1 specification

PURITY : 99% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY at 20°/20°C : 0.785-0.790.
COLOUR : Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 81-83°C.
NON-VOLATILE MATTER : Maximum 0.01% weight.

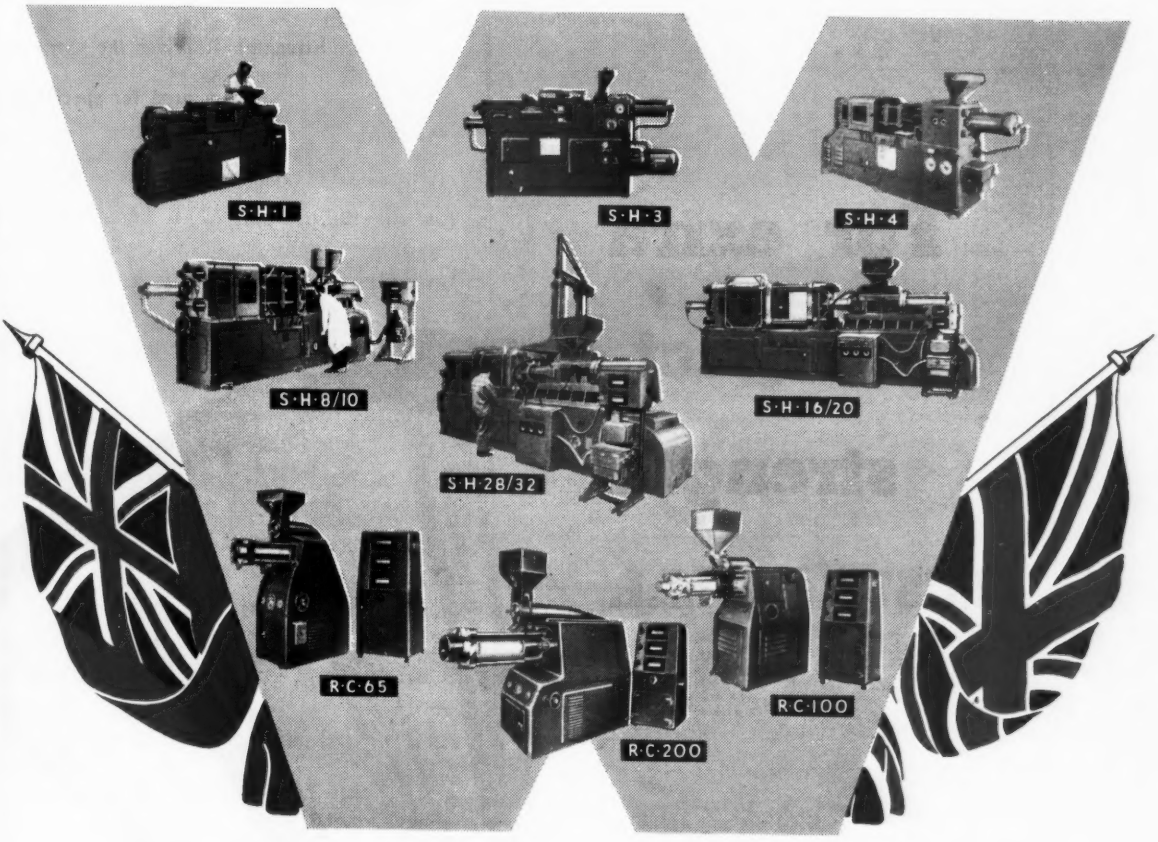
I.P.S.2 specification

PURITY: Minimum 85% Isopropyl Alcohol by weight.
SPECIFIC GRAVITY at 20°/20°C: 0.815-0.820.
COLOUR : Water White.
DISTILLATION RANGE (A.S.T.M. D268): Minimum 95%, 78-81°C.
NON-VOLATILE MATTER : Maximum 0.01% weight.

SHELL

Shell Chemicals Limited, Norman House, 105-109 Strand, London, W.C.2. Tel: Temple Bar 4455
(DISTRIBUTORS)
Divisional Offices: Walter House, Bedford Street, London, W.C.2. *Tel.:* Temple Bar 4455. 42 Deansgate, Manchester, 3 *Tel:* Deansgate 6451. Clarence Chambers, 39 Corporation Street, Birmingham, 2. *Tel:* Midland 6954. 28 St. Enoch Square, Glasgow, C.1. *Tel:* Glasgow Central 9561. 53 Middle Abbey Street, Dublin. *Tel:* Dublin 45775. A.3

In the Coronation Year
of Her Gracious Majesty
Queen Elizabeth II



Windsor

INJECTION MOULDING & EXTRUSION MACHINES

Unbeatable Records—the World's Choice

Look around . . . examine them all, but you are sure to agree on a Windsor model in the end. Your choice will be a wise one because all Windsor Plastic Machines enjoy "unbeatable records throughout the World."
Windsor Mould department is staffed by experts and equipped with the most up-to-date machine tools in the country for producing Moulds, Dies and Ancillary Equipment.

You are invited to visit the R. H. Windsor Ltd. Stands at the forthcoming Exhibitions . . .

BRITISH INDUSTRIES FAIR, CASTLE BROMWICH, BIRMINGHAM. 27th April to 8th May. Stand No. C413/312.

CANADIAN INTERNATIONAL TRADE FAIR, TORONTO. 1st to 12th June. Booth No. 3001/2/3/4.

BRITISH PLASTICS EXHIBITION, OLYMPIA, LONDON. 8th to 18th June. Stand No. A21/A22.

Leaflets and full specifications sent on request

SERVING THE WORLD'S PLASTIC INDUSTRY
Windsor
PLASTIC MACHINERY
TRADE MARK

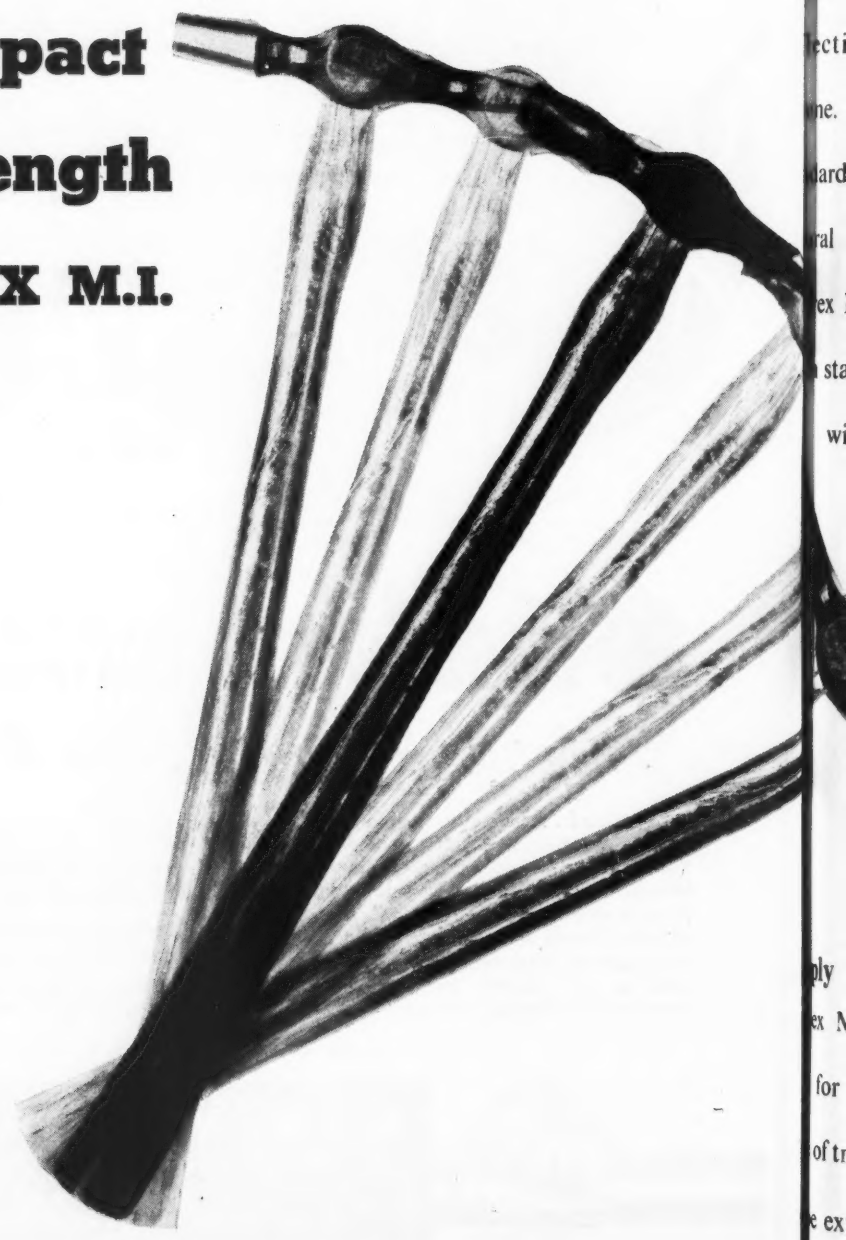
R. H. WINDSOR LTD.
LEATHERHEAD ROAD, SOUTH CHESSINGTON, SURREY
Telephone: EPSOM 5631 (Private Branch Exch.)
Telegrams & Cablegrams: 'WINPLAS', SURBITON, SURREY

E

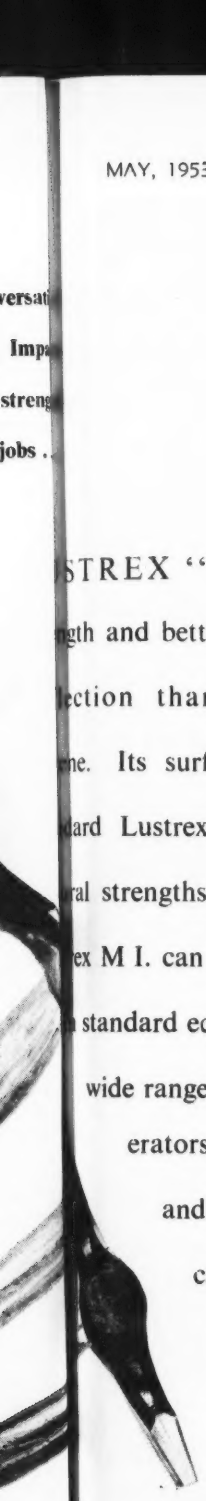
The latest form of Monsanto's versat
polystyrene, Lustrex*, is M I. (Medium Impa
Strength). It brings the extra streng
you need for special jobs . .

For extra impact strength

LUSTREX M.I.



STREX "M I." has higher impact
gth and better elongation at break, and
lection than general-purpose poly-
ne. Its surface finish is the same as
dard Lustrex and the high tensile and
ral strengths of the latter are retained.
ex M I. can be easily injection-moulded
standard equipment. It is suitable for a wide range of applications, from refrigerators and household goods to toys and industrial equipment. You can turn it, saw it, mill it and drill it as easily as general-purpose Lustrex. For drilling, it is superior to ordinary polystyrene.



ply
ex M I. is supplied pelleted and lubri-
for optimum mouldability. There is a
of translucent and opaque colours which
e extended later.

Property	Lustrex M I.	General-purpose Lustrex	Units
Tensile strength	5600–6000	600–6500	p.s.i.
Elongation at break	4.0–5.0	1.5–2.0	%
Modulus of elasticity	3.5–5.0	4.0–5.0	10^5psi
Flexural strength	10,000–11,000	10,000–12,000	p.s.i.
Deflection	0.7–0.9	0.25–0.3	inches
Impact strength izod $\frac{1}{2}'' \times \frac{1}{4}''$ bar	0.6–0.75	0.25–0.35	ft. lbs inch of notch
Softening point B.S. 1493	90–91	90–92	degrees C.

The tensile strength of M I. and general-purpose Lustrex are approximately the same, but the elongation and deflection at break of M I. are 2 to 3 times those of ordinary Lustrex. The impact strength of M I. is also 2 to 3 times greater. The effect of this combination of properties is that the higher impact strength of M I. is obtained while still retaining the gloss and "feel" of general-purpose polystyrene.

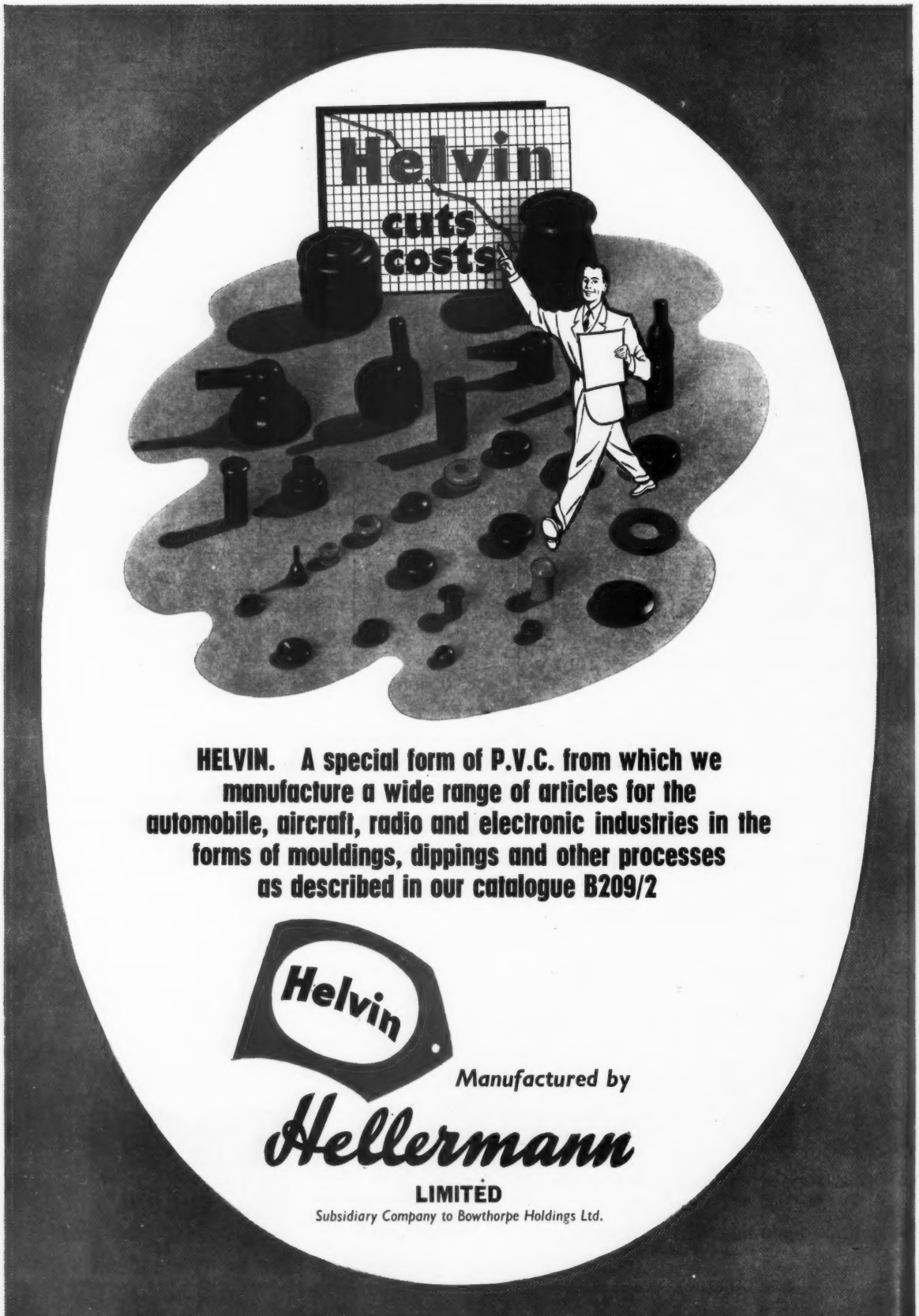
The chemical properties of M I. are substantially the same as for Lustrex general purpose, and it has the same excellent resistance to moisture absorption.

*Write now for full information and technical assistance. (*Lustrex is a Registered Trade Mark)*

MONSANTO CHEMICALS LIMITED,
Victoria Station House,
Victoria Street, London, S.W.1

MONSANTO

In association with: Monsanto Chemical Company, St. Louis, U.S.A. Monsanto Canada Ltd., Montreal. Monsanto Chemicals (Australia) Ltd., Melbourne. Monsanto Chemicals of India Ltd., Bombay. Representatives in the world's principal cities.



HELVIN. A special form of P.V.C. from which we manufacture a wide range of articles for the automobile, aircraft, radio and electronic industries in the forms of mouldings, dippings and other processes as described in our catalogue B209/2

Helvin

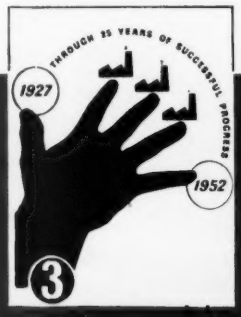
Manufactured by

Hellermann

LIMITED

Subsidiary Company to Bowthorpe Holdings Ltd.

TINSLEY LANE, CRAWLEY, SUSSEX TEL.: CRAWLEY 747/8/9



SUPPLYING INDUSTRY'S NEEDS · YESTERDAY, TODAY AND TOMORROW

25 Years of continuous service

Having previously pioneered the production of Medical Lamps, Messrs. Hanovia Limited in 1934 designed a model Home Sun Lamp.

Collaborating in the project, Insulators manufactured mouldings in Phenolic material for Base and Top plates, Handle, Support Arm, and Reflector Edgings, with all necessary metal inserts moulded in.

These Lamps were built for long service, and thousands are still in constant use after 18 years. Production however, was discontinued in 1940 due to War scarcity conditions, and in 1945 the Company designed a new small model of a different type known as the Prescription Ultra-Violet Lamp.

Once more Insulators were requested to assist by moulding a new range of Phenolic Plastic components, and these more intricate in design than the originals. Metal inserts were again incorporated and, as the larger illustration shows, this combination enabled scarce metals to be saved without loss of efficiency.

This example of close association with our customer shows further proof of our ability to give service and to cope with ever-changing conditions.

May we discuss with you the application of Plastics to your own manufactures?

Insulators Ltd

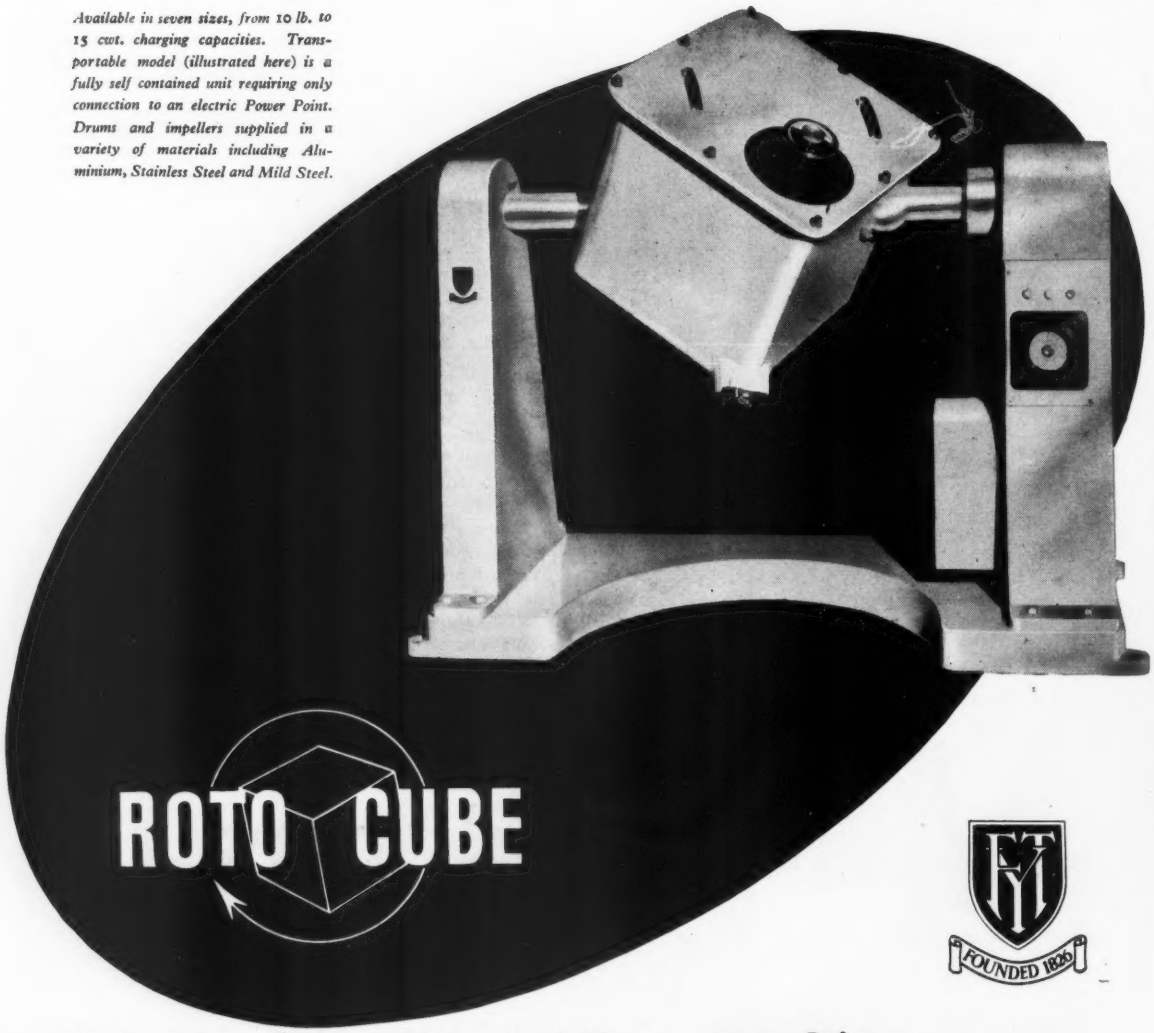
Mouldings of Merit

INSULATORS LTD.,
LEOPOLD ROAD, ANGEL ROAD, EDMONTON, LONDON, N.18
Telephone: Tottenham 1491. *Telegrams: Mermould, Southtot, London*
BRANCH FACTORIES: JARROW, DURHAM AND PADDOCK WOOD, KENT

revolutionary mixing

The cube shaped drum rotating at a compound angle gives a combined interweaving and overturning action which allows an almost perfectly homogeneous mix to be produced in a fraction of the usual time. There are absolutely no dead spots within the drum and attrition, disintegration or powdering of the ingredients is virtually eliminated.

Available in seven sizes, from 10 lb. to 15 cwt. charging capacities. Transportable model (illustrated here) is a fully self contained unit requiring only connection to an electric Power Point. Drums and impellers supplied in a variety of materials including Aluminium, Stainless Steel and Mild Steel.



ROTO CUBE

FOUNDED 1826

revolutionary dry mixing machine

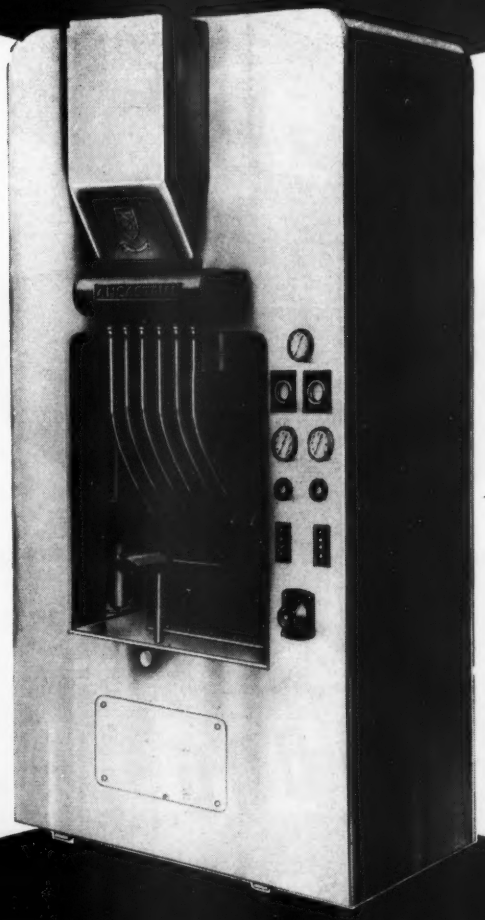
For full information write to Mixer Division DP/P/3,

Telegrams: Yates, Blackburn. **FOSTER YATES AND THOM LTD., BLACKBURN, LANCS.** Telephone: 4224 (4 lines)

London Office: Terminal House, Grosvenor Gdns. S.W.1 Tel.: Sloane 2255 (2 lines). Telegrams: Fostayates, Sowest, London.

FULLY AUTOMATIC

To-day's economies depend on automatic production



This fully automatic moulding press produces simple or complex parts at high speed and low cost, with the minimum of rejects. Fully self contained and requiring no auxiliary equipment, it is easy to instal and its special design makes it equally suitable for long or short production runs.

AUTOMATIC — Measuring of Powder
AUTOMATIC — Withdrawal of Feed Tubes and "Slow Down"
AUTOMATIC — Pressing, Breathing, Curing
AUTOMATIC — Temperature and Pressing Time Control
AUTOMATIC — Opening and Ejection
AUTOMATIC — Checking of Mouldings
AUTOMATIC — Cleaning of Moulds
AUTOMATIC — Reinstitution of Cycle

For full information write to Press Division P/P/3

FOSTER YATES & THOM LTD., BLACKBURN

Telephone : Blackburn 4224 (4 lines) Telegrams : Yates, Blackburn

100... 10,000... 100,000.... 1,000,000

How many knocks can a receiver-bar take?

IT DEPENDS, of course, on the type and quality of the plastic used; which preamble provides us with the opportunity of re-asserting our favourite maxim: the quality of the raw material determines the quality of the finished product. And that suggests one good reason why manufacturers who have built a reputation for producing perfect products demand to be supplied with perfect materials—from East Anglia Plastics.

e.a.p

The E.A.P. Technical Advice Service exists to help you with problems of flow, colour and grade of materials relating to your particular production requirements.

Suppliers of materials to the world's plastics industry

all enquiries for **CELLULOSE ACETATE**
POLYSTYRENE
POLYVINYL CHLORIDE

to be addressed to: ***East Anglia Plastics Ltd***

Telephone: MAYfair 4823 & 1973 *Telegrams: EANPLAST, LONDON*

52 BROOK STREET LONDON W.1

A DIFFICULT MOULDING PROBLEM

-but not for

ROCKITE 3904

"THIS collector provides a somewhat difficult moulding problem due to the large size of the metal inserts (rings, current carrying studs, etc.) in relation to the moulding itself. This is made more complex . . . . . " write METROPOLITAN-VICKERS ELECTRICAL CO. LTD., "by the variation of temperature, and temperature rise attained by the machine during normal operation. 'Rockite 3904' possesses the necessary electrical properties and dimensional stability to withstand these conditions."

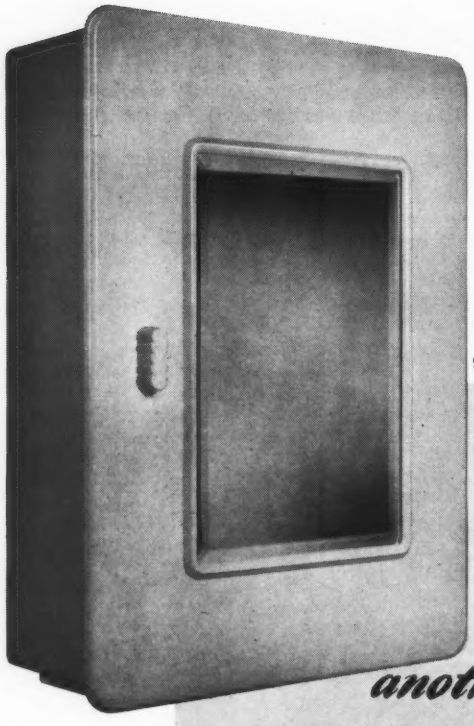
"3904" is one of the "Rockite" Special Purpose phenolic materials that have been developed to cover a wide field of applications requiring exceptional properties of surface finish, strength, chemical resistance, etc. Please write for further information.

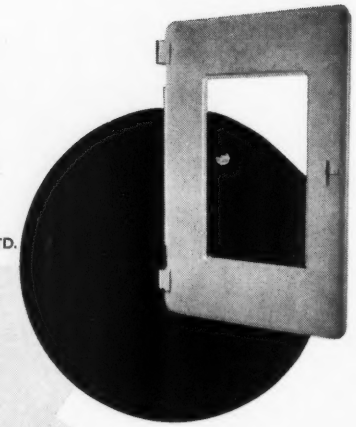
BRITISH RESIN PRODUCTS LIMITED

BRP SALES AND TECHNICAL SERVICE: 21 ST. JAMES'S SQUARE · LONDON S.W.1 · TELEPHONE: WHITEHALL 8021-7

"Rockite" is a Regd. Trade Mark

F



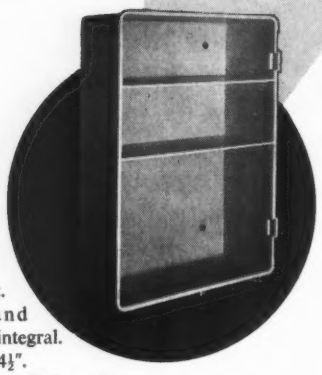


BATHROOM CABINET
By courtesy of Messrs. HOLT SIRON & CO. LTD.

another example of

CLIFFORD LARGE SCALE MOULDING

From **12** ounces - to **60** ounces



Moulded throughout. Shelves and hinge lugs integral. 16″×12″×4½″. Cubic volume 780 cu. ins.

Press capacity to maintain rapid, large-scale production; **experience** to master moulding problems, **Engineers** ready to advise on latest developments and specific requirements . . . this tripart service is the reason why eminent firms say ***Call in Cliffords!***

CLIFFORD MOULDINGS & CASTINGS COMPANY

A member of the Clifford Group of Companies.

Proprietors: Clifford Covering Ltd.,
Wharfdale Road, Tyseley, Birmingham, 11. Tel.: ACOcks Green 1126/7

2502

MOULD MAKING

made easy for short runs

IN LOW TEMPERATURE THERMOPLASTICS

Spray LOW TEMPERATURE MELTING NON-SHRINKING ALLOYS....

MAKES MOULDS FROM PATTERNS OF ANY MATERIAL

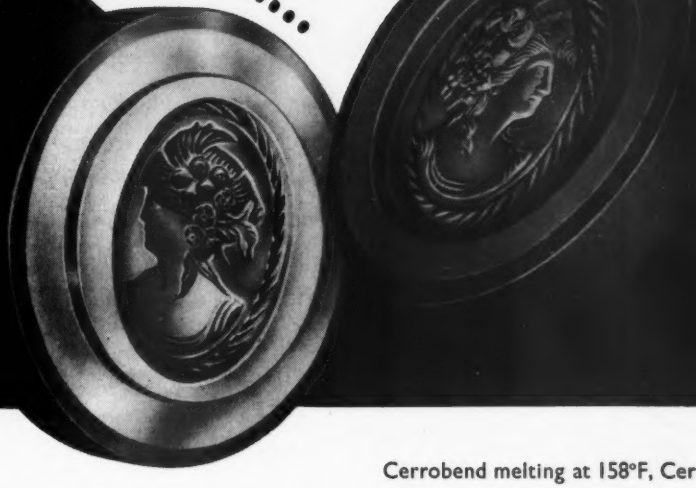
PERFECT REPRODUCTION

LOW PRODUCTION COST

100% METAL SALVAGE

NO POLISHING

HIGH LUSTRE FINISH



NO EXPENSIVE EQUIPMENT

NO HIGHLY SKILLED LABOUR

Cerrobend melting at 158°F, Cerrobase at 255°F and Cerrotru at 281°F are easily sprayed against master models with inexpensive equipment. The resultant negative cavity, reproducing the finest detail, provides excellent mould for short runs in thermoplastics. After use moulds may be re-melted and metal fully recovered.

★ Technical advice in selection and application of correct alloy to suit your problem available on request.

CERRO

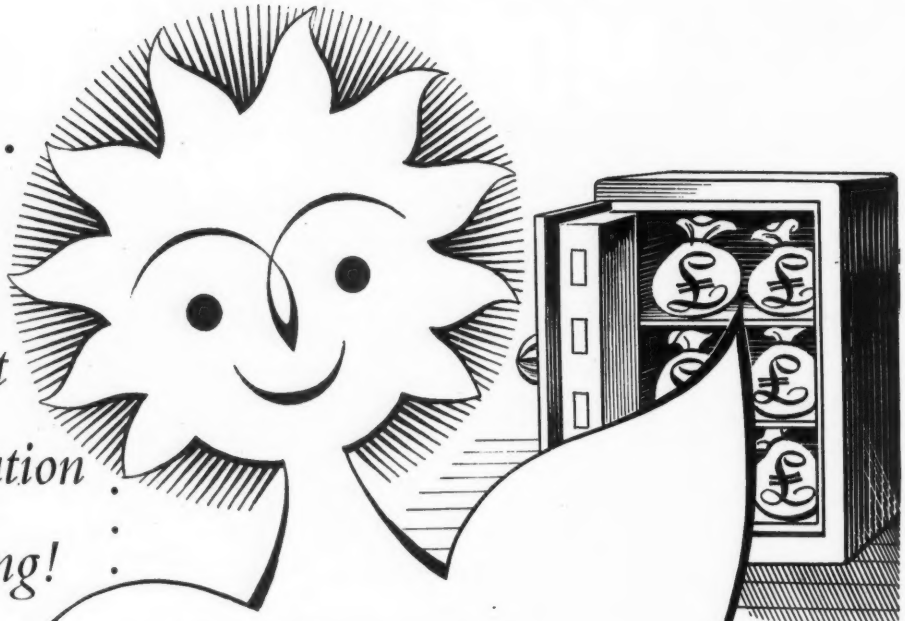
CERROCAST
CERROTRU
CERROBASE
CERROBEND

Low-Temperature-Melting Non-Shrinking Alloys ALLOYS

MINING & CHEMICAL PRODUCTS LTD

MANFIELD HOUSE — 376 STRAND — LONDON — W.C.2

I've got the right combination for saving!



Mr. Therm has many saving graces. With gas and gas equipment he lets you tap the exact amount of fuel you need (without waste) for a thousand different jobs. To expand his economy Mr. Therm adds a further combination of virtues: flexibility of use; accuracy of self-adjustment; rigid control of fuel consumption; speed in reaching working temperatures; cleanliness of operation. In fact, Mr. Therm is so versatile that he can usually be found helping wherever people work.

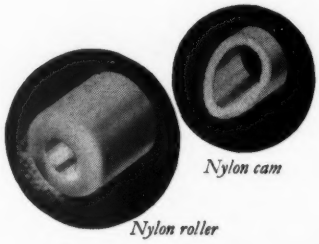
Mr. Therm burns to serve you

THE GAS COUNCIL · 1 GROSVENOR PLACE · LONDON · SW1

Mr. THERM HELPS IN PLASTICS MANUFACTURE
He makes himself very useful in platen heating, heating mixing machines and moulds, pre-heating powders before moulding and the curing of vulcanised products.

An Expanding Service to Industry...

We at Fraser and Glass have grown up with industrial plastic problems for the last 30 years—and solved them so successfully that we now have one of the largest and best equipped moulding shops in Europe. Did you know, for instance, that we can now undertake *injection* mouldings up to 80 ozs.? And did you know how *many* plastic materials and processes we offer today? Here are some of them . . .



Nylon cam

Nylon roller

FRASER *and* **GLASS**
the plastics people

Materials

THERMOSETTING

Phenol Formaldehyde, Urea Formaldehyde

THERMOPLASTIC

Cellulose Acetate, Cellulose Acetate Butyrate, Polymethylmethacrylate, Polystyrene including heat resisting and high impact grades, Nylon. Flexible plastics: Polyethylene, Polyvinylchloride

Processes

COMPRESSION MOULDING 6 to 500 ton presses

TRANSFER MOULDING

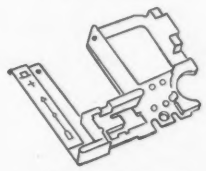
THERMOPLASTIC INJECTION MOULDING

Mouldings from 1/80th oz. to 80 ozs.

THERMOPLASTIC BLOW MOULDING

Polyethylene bottles and other containers

Phenolic switch



Hearing aid chassis in cellulose acetate

Polyethylene bottle

FRASER & GLASS LTD., WOODSIDE LANE, LONDON, N.12 (HILLSIDE 2224-5)

Sterling

SYNTHETIC RESINS and MOULDING POWDERS

WITH *Sterling* TECHNICAL ADVISORY SERVICE

M.O.S.
A.I.D.
POST OFFICE
ADMIRALTY
APPROVED

STERLING policy is to give close personal attention to customers' individual requirements and to maintain prompt delivery of highest quality materials at the lowest possible prices.

✳ STERNITE **Synthetic Resins**

Novolak resins for moulding powders.
Laminating and Impregnating resins for all purposes.
Water Soluble resins.
Liquid resins for grinding wheels.
Adhesives and Cements.

✳ STERNITE **Phenolic Moulding Powder**
FOR COMPRESSION AND TRANSFER MOULDING
(*Conforming to BSS.771—Hall Mark Certified*).

General Purpose Grades: Easy flowing, fast curing, excellent finish, consistent quality.

Special Purpose Grades: *Including :*
Telephone Quality SPF.110/2.
High Resin Content Grade SPF.105/5.
High Dielectric Grades SPF.100/5.HD. and SPF.34.HD.
Shock Resisting Grades SSR.400/1 and SSR.400/7.
Heat Resisting Grade.
Water Resisting Grade.
Acid Resisting Grade.
Low Contraction Grade.
Cabinet Grades.
Graphite Loaded Grades.
Chemically Inert Grades, etc., etc.

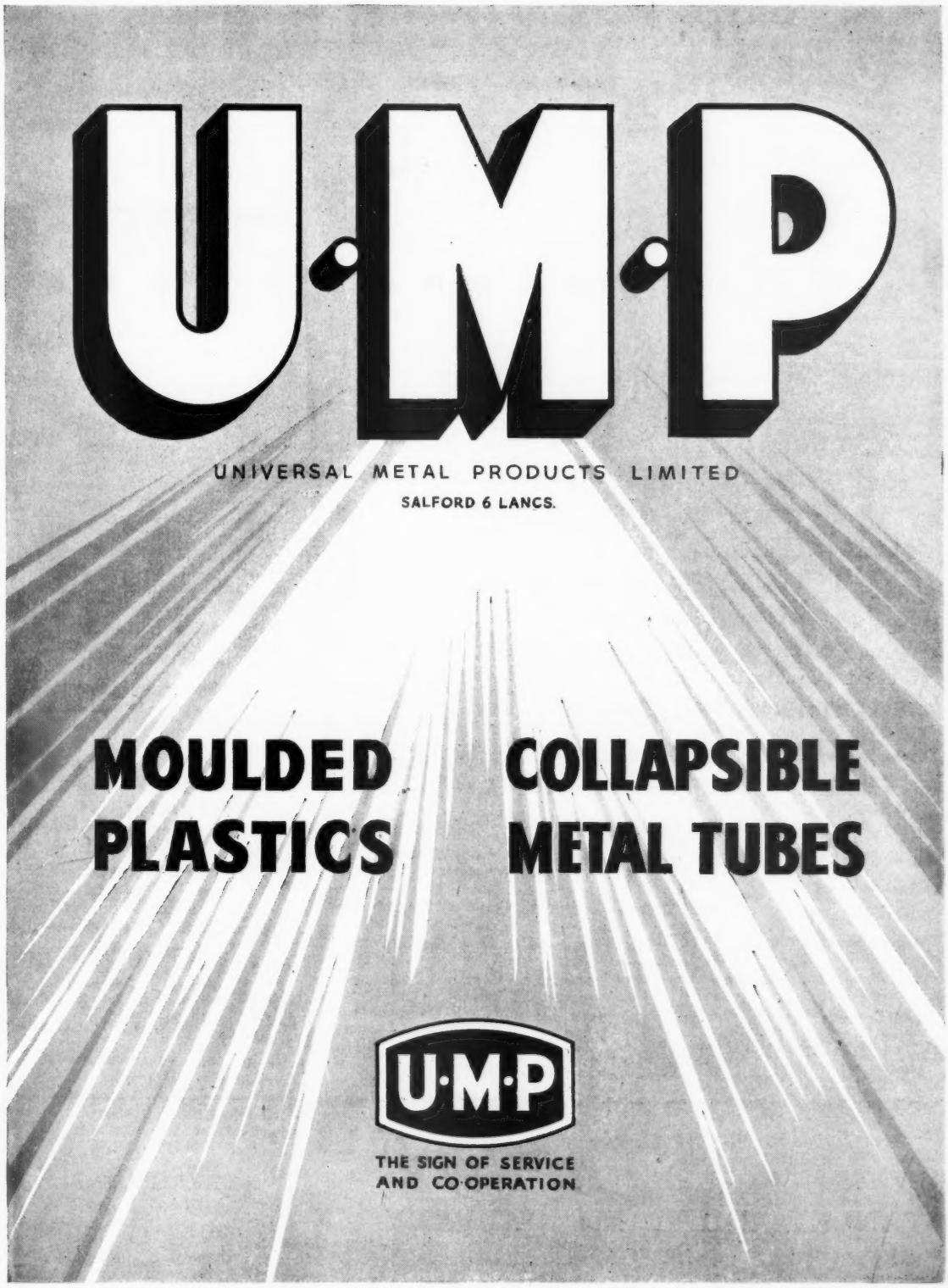
✳ STERNITE **Urea Moulding Powder**
Available in limited range of dark colours in wood-filled grade.

Members
THE BRITISH PLASTICS FEDERATION

STERLING MOULDING MATERIALS LTD.

Export enquiries to -
STERLING PLASTICS LTD.
(Address alongside)

STERLING HOUSE, HEDDON STREET, LONDON, W.1
Phone : Grosvenor 5301/5 Grams : Stermold, Piccy, London Cables : Stepla, London
WORKS; STALYBRIDGE, CHESHIRE


U·M·P
UNIVERSAL METAL PRODUCTS LIMITED
SALFORD 6 LANCS.
MOULDED PLASTICS
COLLAPSIBLE METAL TUBES
U·M·P
THE SIGN OF SERVICE AND CO-OPERATION

PACKING THE CORONATION COINS

Collectors all over the world are receiving their sets of Coronation Coins in welded "envelopes" made of VITRONE crystal-clear P.V.C. sheeting. VITRONE sheeting was chosen by the Royal Mint as the material affording perfect protection and perfect display.

VITRONE RIGID P.V.C.

is tough, resistant to chemical attack and non-inflammable. It is an easily formed material and ideal for :—

Refrigerators,
Chemical Plant,
Printing Plates,
Radio and Television Components,
Outdoor signs and displays,
Deep draw mouldings, etc.

VITRATHENE POLYTHENE MATERIAL

The outstanding combination of mechanical strength, chemical resistance and electrical properties, together with ease of working, makes Vitrathene sheet a valuable addition to industrial materials—especially for the chemical industry. Vitrathene is also an ideal material for Surgical Splints and Jackets.

Fabrication is easy. VITRONE P.V.C. *sheeting can be stitched and also welded for speed of production. Please send for samples. Better still, come and see the full range of* VITRONE P.V.C. *and* VITRATHENE POLYTHENE *plastics on Stand X.9, B.I.F., Earls Court.*

VITRONE RIGID P.V.C. SHEETS

Sheets size 54″×24″ with mirror finished surfaces and in thicknesses from .010″ and upwards. Sheet size 96″×36″ in thicknesses from 1/32″ and upwards with Satin finish surfaces.

VITRATHENE POLYTHENE SHEETING

Sheets size 36″ × 36″ and 84″×36″ and Rods, Tubes and Blocks.

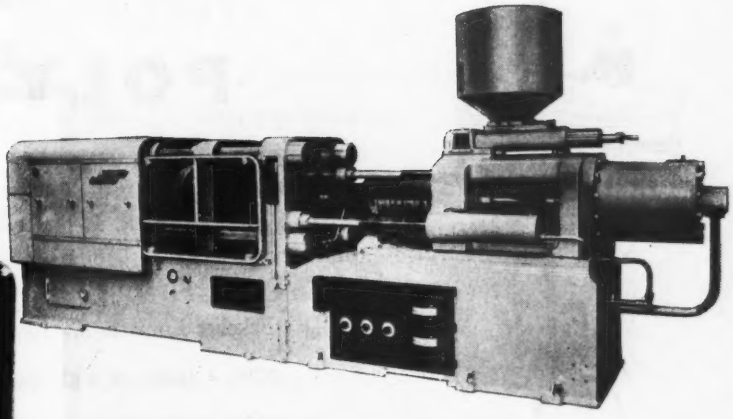
EXTRUSIONS

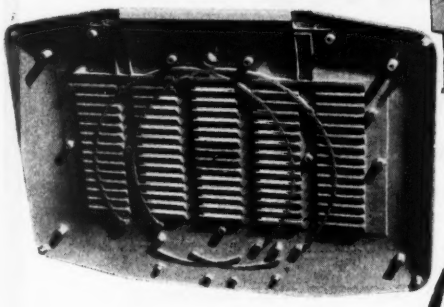
To your requirements in all shapes and sections.

STANLEY SMITH and COMPANY
WORPLE ROAD · ISLEWORTH · MIDDLESEX

HOUnslow 3406/9

facts *that speak for themselves*





PYE RADIO CABINET

WEIGHT - 14 ozs.
AREA - - - $15\frac{1}{2} \times 10\frac{3}{8}$
MATERIAL-Polystyrene
TIME-100 secs. (approx.)

Moulded by British Xylonite Co. Ltd.(Halex Division) for PYE Ltd.
Pin-gated Mould by Minerva Engineering Co. Ltd.

PYE RADIO RECEIVER COMPLETE

The design and proved performance of PECO Injection Moulding Machines result in the production of plastic articles of the widest range, from simple domestic goods to intricate mouldings such as this Radio Cabinet illustrated. Always these machines give the same perfect, undeviating production flow. Do you ask for impartial recommendation? It comes from the manufacturers all over the world who have installed them.

Illustrated literature describing the full range of PECO machines will be sent on request.

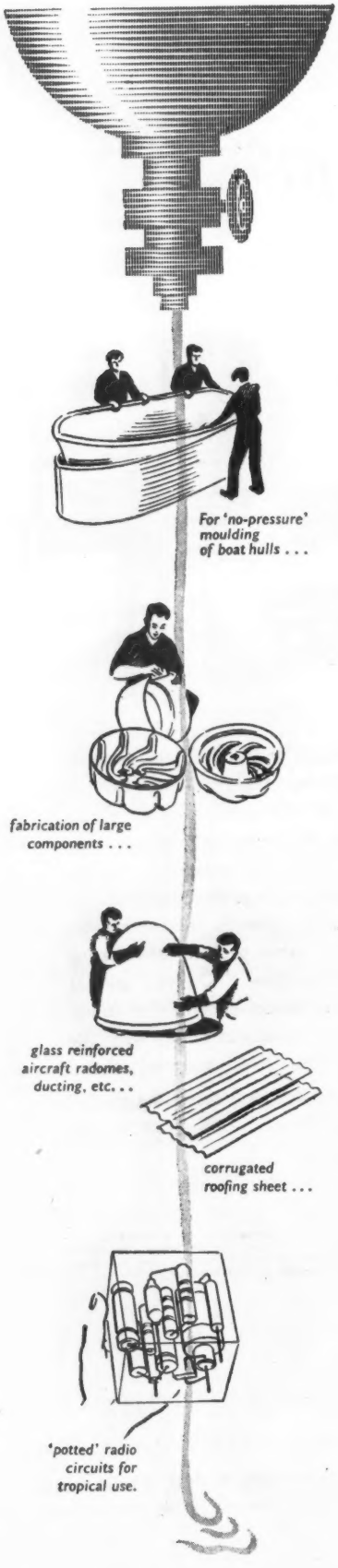
MOULDS

PECO MOULDS. Expert designers and mould makers are employed and moulds can be supplied to samples submitted, including die-sinking models if required. An important side of the Company's work is the hobbing of cavities for moulds and medallions—the plant includes a 3,000-ton hobbing plant. Master hobs to customers' samples made as required.

ACRE STREET, BATTERSEA, LONDON, S.W.8, ENGLAND

Telephone: Macaulay 1212 Telegrams: "Profectus, Claproad, London" Cables: Profectus, London

G


For 'no-pressure' moulding of boat hulls . . .
fabrication of large components . . .
glass reinforced aircraft radomes, ducting, etc. . .
corrugated roofing sheet . . .
'potted' radio circuits for tropical use.

Now in Production

BAKELITE POLYESTER RESINS

Bakelite Limited now have available in production quantities a range of high quality Polyester Resins together with the appropriate catalysts for use in curing at room or elevated temperatures. The materials have been designed to cover all aspects of contact resin technology including glass fabric laminating, casting and low pressure moulding and potting of electrical components. Information leaflets on these materials are available on request to any of our sales offices.

TREFOIL

BAKELITE PLASTICS

REGD. TRADE MARKS

First and Still Foremost

Products of Bakelite Limited include: Synthetic Resins & Cements Phenolic, Urea, Alkyd & Silicone Moulding Materials · Laminated Sheet, Rod & Tube · Glass Fibre Laminates · Rigid & Flexible PVC Sheet · Moulding & Extrusion Compounds · Decorative Laminated Plastics.

Sales Offices: LONDON, Sloane 0898; BIRMINGHAM, Midland 5911/4; MANCHESTER, Blackfriars 5174/7; GLASGOW, City 6825.

BAKELITE LIMITED · 12/18 GROSVENOR GARDENS · LONDON SW1

Plastics

DEALING WITH THE MANUFACTURE, USES AND POTENTIALITIES OF PLASTIC MATERIALS

PROPRIETORS: TEMPLE PRESS LIMITED · CHAIRMAN and MANAGING DIRECTOR: ROLAND E. DANGERFIELD

CONTENTS

	Page
Editorials	137
Moulding Powder and Shot	138
Progress in Extrusion	139
The Effect of High Energy Radiation on some Long Chain Polymers, by Dr. A. Charlesby	142
Plastics in the Service of Man	146
World's Industry Employs Plastics	150
British Industries Fair, 1953	151
Letters to the Editor	161
New Productions	162
Plastics News	163
Techniques of moulding Polytrifluorochloroethylene	166
British Plastics Convention 1953	170
Patent Review	173

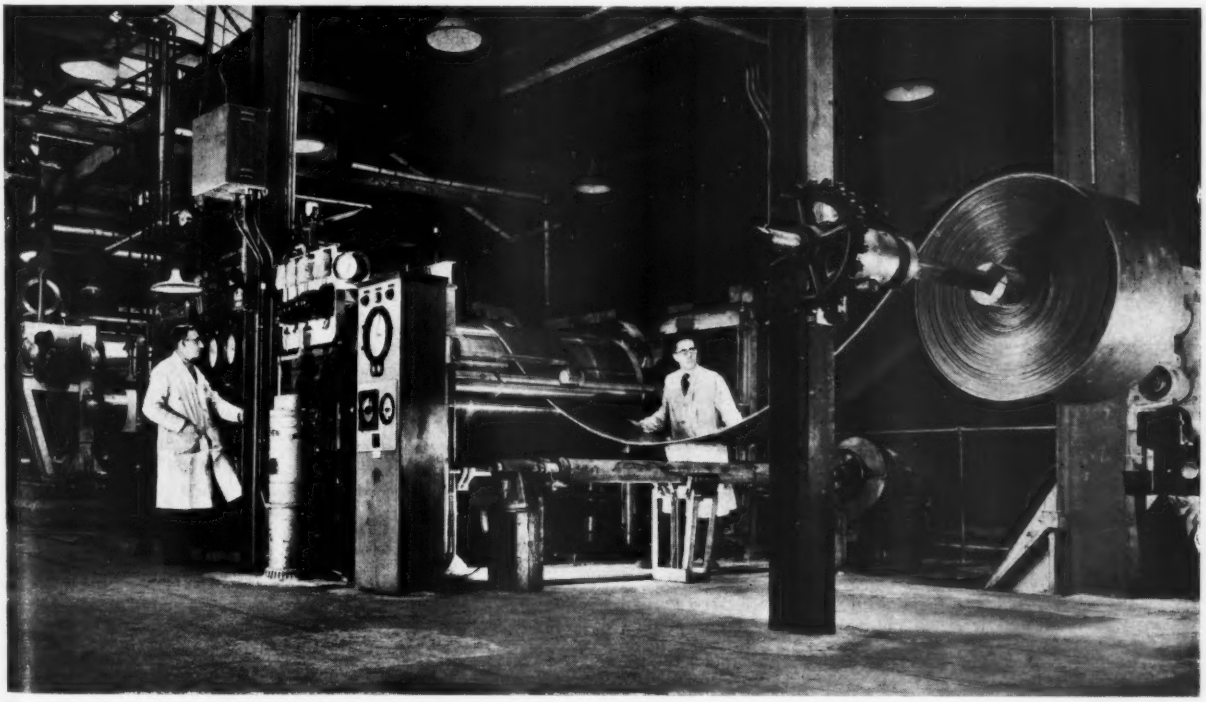
EDITOR: M. D. CURWEN, B.Sc., A.R.I.C.

Printed in England and Published monthly by the Proprietors, Temple Press Limited.
Annual Subscription Rate 34/-. Shorter periods pro rata.

Advertisement and Publishing Offices:
Bowling Green Lane, London, E.C.1.
Telephone: TERminus 3636

Editorial Offices:
27, Shaftesbury Avenue, London, W.1.
Telephone: GERrard 4406

Heavy-duty conveyor belting surfaced with p.v.c. being manufactured on a Rotocure machine at the Wellingborough factory of Rubber Improvements, Ltd.



BMI79

destination EVEREST

London to Katmandu, one hundred and fifty miles by porter to Everest, then the same journey in reverse—that is the test awaiting this glass reinforced plastics box which we have made for the British Everest Expedition.

The box carries Micro Gas Analysis Equipment to be used at frequent intervals to determine the oxygen consumption of men working at altitudes up to 20,000 feet.

The going is tough and the analytical equipment is very delicate—undoubtedly the experience thus gained about the behaviour of glass reinforced plastics components will assist greatly our development of this new material.

BOX MADE FROM GLASS CLOTH AND POLYESTER RESIN USING THE LAYING-UP METHOD . . . .

BRITISH MOULDED PLASTICS LTD
AVENUE WORKS • WALTHAMSTOW AVE • LONDON E 4 *LARkswood 2323*

MOULDED PRODUCTS LTD
CHESTER ROAD • TYBURN • BIRMINGHAM 24 *Erdington 2201*

TWO NATIONAL PLASTICS COMPANIES

Plastics

VOL. XVIII. No. 190 MAY, 1953

EDITORIALS

Fair Days

HOW fast the depression of 1952 is disappearing is difficult to assess but spring has begun with more than normal hope for better times and with considerable elation. We have had the Radio Component Exhibition; we have heard, most of us with gratification, the Chancellor of the Exchequer's Budget; we are in the midst of the British Industries Fair; and in June there will be the British Plastics Exhibition; to cap it all, June 2 is our Queen's Coronation Day. Nineteen fifty-three will indeed be a year to remember.

The Radio Component Exhibition is almost a "private" affair, but we always regard it as one of the most impressive and it always appears to be more crowded for its size than the Ideal Home Exhibition or the Schoolboy's Exhibition, which is saying a great deal! All visitors are scientists and technologists; we see there a galaxy of brilliant discoveries and inventions in the field of radio, television and electronics, and more than in any other exhibition outside our own we see the full impact of plastics in these branches of electrical science. It may have been an illusion, but on our recent visit it seemed as if the total weight of plastics in the components was greater than that of metal. Two exhibits only, and they were of two metal-casting companies, were completely devoid of plastics.

A number of our own moulders and fabricators showed their medals, while the Ministry of Supply displayed some of the work being carried out at Harwell on the effect of high-energy irradiation on a number of plastic compounds, including the formation of expanded polymethyl methacrylate. We published some notes on this irradiation in our March issue and now include in this present number a special article contributed by Dr. Charlesby, of the Atomic Energy Research Establishment.

The British Industries Fair, now running as this issue appears and with which we deal at length in these pages, has changed greatly in the past few years, so far as the plastics sections are concerned. As is well known, there has been considerable dissatisfaction with the results of previous British Industry Fairs at Earls Court, where for many years past the plastics industry had created its own very large section. At one time as many as 40 companies had combined to install their exhibits in one confined area—and a bold, decorative and instructive show they made of it, too.

Yet in spite of this, the direct results most of the exhibitors hoped for never did materialize, or at least did not come up to expectations. This, the high cost of modern stand erection and of continual attendance of a staff that had few inquiries to deal with and could be better employed at their normal work, created a demand to obtain results by other means. The first of these entails a movement to Castle Bromwich, which we have always claimed to be a more suitable and better-arranged exhibition, and that is where most stands, which will include most of the machinery manufacturers' plants, the raw material producers and many moulders and fabricators, will be seen this year. On the other hand, a number of die-hards insist, with good reason, that they prefer Earls Court and Olympia, and there they will be seen. The good reason is that in past years they have done excellent business indeed, which is, after all, the best of good reasons.

The second means of obtaining better results is that provided by the biennial British Plastics Exhibition and the concurrent Plastics Convention. The first was held in 1951 and was so successful that the 1953 Exhibition is already certain of even better results. The rapid growth of the industry and its manifest importance to the economics and progress of the country made this segregation inevitable.

Extrusion

ABOUT 15 years ago, which seems a long time in the rapidly changing scene of our industry, we went to see the work of the late Mr. J. Veit, who had then been producing polyvinyl chloride extrusions for some years and thus earned the title of pioneer of the process for p.v.c. in this country. The earliest companies that began operations in those days were Suflex Ltd. and Tenaplas Ltd., more or less contemporaneously, and these were followed a few years later by Mr. Veit's company, Duratube and Wire Co. Ltd.

The work we saw was very exciting. Not that we did not know that cellulose nitrate had been extruded nearly 70 years earlier, that extruded rubber and casein were active manufactures and that phenol-formaldehyde resins were being turned by the extrusion process into 4-in. tubes by the mile. But p.v.c. was then new, it possessed properties very different from any other then known plastics material and it promised to succeed in its attempts to oust, in part, rubber and fabric for the insulation of electric wire. Simultaneously, plasticized p.v.c. tube was manufactured and was soon followed in the early war days by strip for belting in a variety of single and multiple colours.

Today, extrusion has assumed full stature—the number of companies concerned therein has grown greatly (a recent visit to the Radio Components Exhibition at Grosvenor House showed a surprising increase in the number of makers of covered wire, which included polythene and nylon) while the British Plastics Federation has long contained an "extruder's" section. In passing, it is noteworthy that p.v.c.-covered wire is not the prerogative of the electrical industry, for one of the famous "600 Group" of companies, the New London Electron Works Ltd., has for some time developed p.v.c.-covered wire for use in horticulture, a most intelligent and worthy application.

Perhaps the most notable expansion in the past five years has been the development of extruded plastics for new industrial purposes and in such fields most of the modern plastic materials have carved their own paths, although p.v.c. retains its ascendancy so far as quantity and versatility are concerned. A more detailed review of this aspect of the industry is published on p. 139 of this issue. It should also be noted that this progress has been made possible largely because of concurrent development in extrusion machinery capable of handling, with adaptation, a wide variety of raw materials and working with a lower consumption of energy. It is also pleasing to record that the advances thus made in the plant have been in large part responsible for some lifting of the veil of secrecy that only a short time ago covered the technology of extrusion. To date there is still only one published book

on the subject in English. Most of the art lies in the "know-how" and we see no adequate reason why those who "know-how" should disclose the more intimate details which are their own special property and pride. On the other hand, it is important that the industrial world outside our own should know something about the plastics extrusion industry, what the extrusions are made of and what services they are capable of rendering. One of the letters published in our "Letters to the Editor" page gives an inkling of what we mean.

As a footnote to this subject, we may mention the fact that, while two or three months ago many of the extrusion-making factories were suffering from the general malaise, the scene changed overnight to an almost super-abundance of work.

Protective Helmets

THE appeal to motorcyclists by Mr. Gurney Braithwaite, of the Ministry of Transport, to wear crash-helmets, has sent up the production of such protective head-gear enormously. This has been followed by greatly increased demands throughout the world because Great Britain holds the lead in motorcycle and all accompanying manufactures, including protective helmets. There is, in this country alone, a potential market of more than a million. Laminates are widely employed.

MOULDING POWDER AND SHOT

Nobody can accuse our industry of dilatoriness in adopting new materials. It was only last year that we published Mr. J. E. Gordon's excellent paper "The Future of Plastics in Engineering," read before the Plastics Institute, and I remember reading a new name in the resin field—sebalkyd. This, I presume, is of the polyester type and termed alkyd for its relation to the alkyd resins used so widely in the paint and varnish industry; no doubt it is made from sebacic acid and a glycerine-like compound. Its special virtue is that it can be foamed *in situ*, e.g., between sheet structures, to form a very light expanded form still retaining considerable strength. I was exceedingly interested to find at the stand of Thermoplastics, Ltd., at the Radio Components Exhibition last month, that this company was using the resin for "sandwich" constructions. Mr. Gordon suggested that such expanded materials, which offer the possibilities of building large "solid" units with special properties from thin shells, might have important uses in the engineering world, in addition to the present use in aircraft component construction.

Expanded Plastics

* * *

The *Evening News* recently published the following letter from a lady reader:—"When will the makers of plastic thimbles realize that these wonderfully cheap, hygienic and useful articles are often left unsold on drapers' counters because the makers have not the sense to make them roughed inside and thus prevent them slipping off the finger. I file mine inside before I use them." While it is unlikely that moulders can afford to carry out a post-moulding operation on such small, low-cost units without employing some type of automatically fed automatic grinding device, I should have thought one or two shallow concentric "rings" could be moulded within and near the edge and would offer no difficulty in removal from the mould. Alternatively, longitudinal channels might serve the purpose just as well, without introducing extraction problems.

Praise and Blame

* * *

Whatever readers think of technical journals (no, I don't want to receive your opinions), at least they indicate that the industries with which they deal do exist! Indeed, whatever the standard of the journal in a country, it must mean that the industry is of considerable strength: in fact, I may add that in modern industrial times the strength of the industry (by which I mean the intelligence and technical strength as well as the number of factories and workers in it) is roughly in proportion to the thickness of the journal! It is, therefore, with great pleasure that I announce the first number of a Brazilian journal, *Revista Brasiliera de Plasticos*, for it means that Brazil with 60,000,000 inhabitants is growing in wealth, in technical knowledge and in the ability to create material comforts for its inhabitants. Sydney A. Latini, who directs the journal, tells me that Brazil is producing 5,900 tons of polystyrene p.a., 2,000 tons of "phenolics," 300 tons of urea resins, and 600 tons of cellulose acetate. Polyvinyl compounds, polyethylene, most of the "urea" resins used, melamine resins and acrylics, are imported. There are some 110 companies manufacturing raw materials, moulding and fabricating and employing 12,000 workers and 1,000 machines.

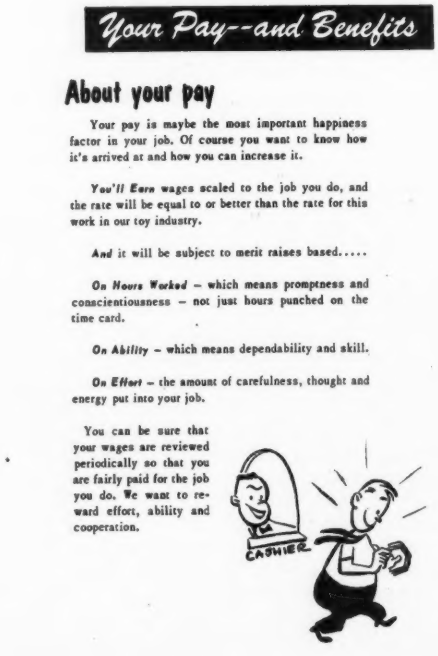
Parabens Brazil!

* * *

The recent Productivity Report on plastics moulding contained some interesting details of the methods adopted in the U.S.A. to improve relations between workers and factory management. My friend Islyn Thomas, who runs a big toy-making company in Newark, New Jersey, and is also interested in one or two plastics moulding concerns here, has sent me a booklet he issues to every newcomer to his company; it is very appropriate to the subject. The booklet is called "Hi! Nice to have you with us!," and is not only instructive but also amusing. I reproduce here one page which needs no comment. The rest of the book deals with subjects ranging from notes on the company's history to profit sharing and details of the various operating sections.

DOGSBODDY.

Improving Factory Relations



Your Pay--and Benefits

About your pay

Your pay is maybe the most important happiness factor in your job. Of course you want to know how it's arrived at and how you can increase it.

You'll Earn wages scaled to the job you do, and the rate will be equal to or better than the rate for this work in our toy industry.

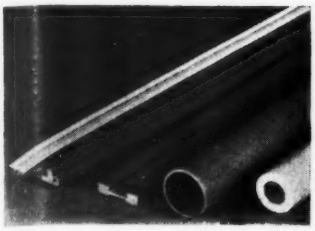
And it will be subject to merit raises based.....

On Hours Worked – which means promptness and conscientiousness – not just hours punched on the time card.

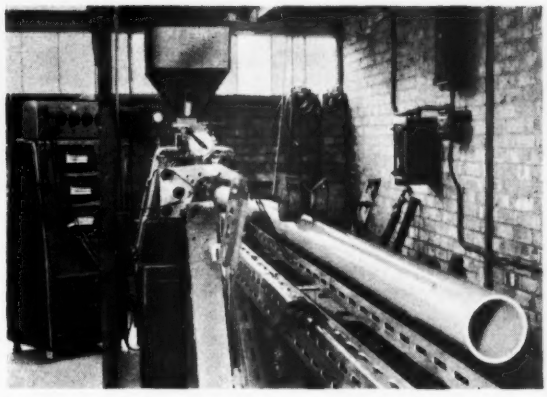
On Ability – which means dependability and skill.

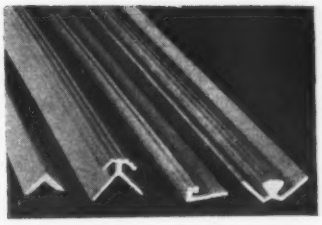
On Effort – the amount of carefulness, thought and energy put into your job.

You can be sure that your wages are reviewed periodically so that you are fairly paid for the job you do. We want to reward effort, ability and cooperation.



(Left to right) First and third are p.v.c. strips for terrazzo flooring; the second is a price ticket holder, and the tubes are for water and acid conveying.
(Right) A large hard p.v.c. tube extruded on an R.C.100 machine.





(Left to right) Corner strip for wall panels; panel retaining strip (exterior corner); edge finishing strip and retaining strip for interior corner. Nos. 2, 3 and 4 are made for Warerite, Ltd. for edging panels.

Progress in Extrusion

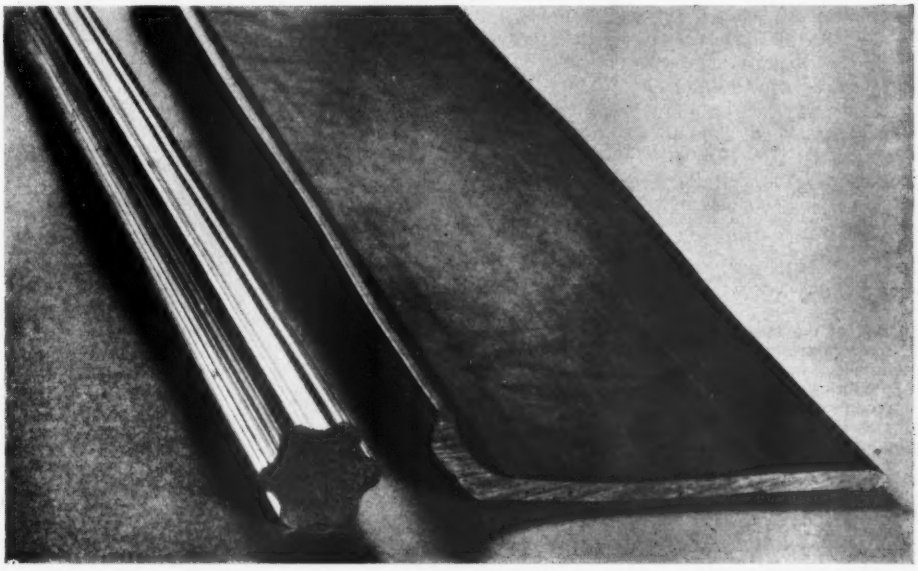
With Special Reference to the Work of Melwood Thermoplastics, Ltd., Harpenden

THE art, or should we say science, of extrusion, which signifies the continuous production, by pressure of material through a die, of forms of uniform cross-sections, is stated to date from the production of lead pipe in the late 18th century. The general possibility could scarcely have been completely unknown to the Romans who perhaps could not extrude their lead pipes efficiently and made short lengths by casting. At any rate they did make lead pipes. There is also the certainty that the wire drawers of very ancient times did so because their technology permitted them to pull metal through a die but did not extend to pressing it through one with a plunger.

A vast variety of materials, metals and non-metallic elements, inorganic and organic compounds including disrupted fibres have been extruded, the process of continuous production offering immediate economic advantages over other methods of producing the same form.

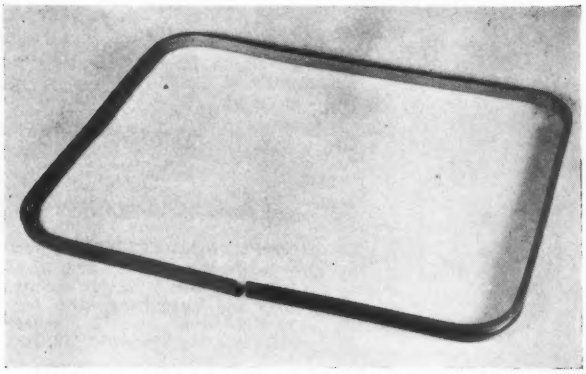
The first plastic material to be extruded was cellulose nitrate about the year 1870; it was followed by the experimental extrusion of casein for fibre-making in 1898 but " dry " casein was not extruded until some 10 or more years later. Today most other plastic materials, cellulose acetate and cellulose acete-butyrate, methyl methacrylate, polystyrene and its copolymers, the polyvinyl compounds, polythene, nylon and polytetrafluorethylene are all extruded. Some of the foregoing have small applications limited to specific industries, the greatest " mileage " produced being with polyvinyl chloride, cellulose acetate and polythene, probably in the order given. In addition the extrusion of thermosetting resins of the phenolic type which began in 1935 (see *Plastics*, June, 1937) is still being carried out in Gt. Britain. The production is, however, small compared with the rapidly increasing development of the thermoplastics which possess a much wider range of physical characteristics from hard and rigid to flexible and soft in all gradations and in addition excellent properties so far as resistance to electricity, water, chemicals and abrasion is concerned.

The variety of application of extruded thermoplastic materials is therefore very great and the range of different properties possessed by them ensures an ever increasing adoption of new forms or new uses for existing forms. To date, the use of p.v.c. and its close relatives available in hard



(Left) Cellulose acetate butyrate (Tenite II) fluted rod. This is turned on a lathe into screw-driver handles.

(Right) P.v.c. coving section. This is used in conjunction with plastic flooring and is fixed at the junction of the floor and the wall. It also forms the wainscoting.



TV. frame of slightly plasticized p.v.c. Lengths are heated and formed on a jig.

or soft varieties, have in the last 18 years progressed from the early production of simple and compound colour beltings and the electrical insulation of wire (probably the largest single use) to table and tray edgings, tennis court markings, draught-preventing beadings, garden hose, panelling trims, bag-handles, horticultural " string " and strips, floor tiles and sheet and film and the more recent production of hard p.v.c. tubing for the conveying of acids and vapours in the chemical industry and for the manufacture of rollers of many types for the paint and other industries.

The widest application for cellulose acetate in extruded form is rigid tubing for the more modern pencil and pen-barrels. In addition tough, rigid beading has been produced.

Polythene has made startling progress during the last seven or eight years almost entirely in the form of piping for the chemical industry both for acid conveyance and as drainage. In the latter field one company has been producing 12-in. piping successfully. Of great promise also is the much wider field for smaller polythene piping for the distribution of water in agricultural districts.

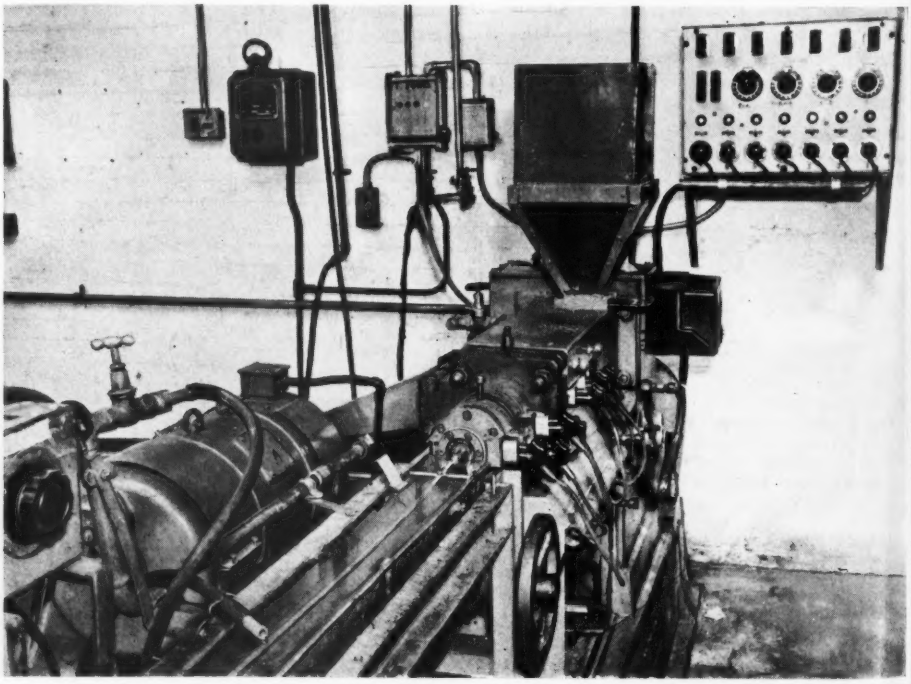
Nylon is being extruded mainly in cylindrical form for subsequent machining, but some production of profiled material is made for small gears.

As an example of production in this country we may refer to the work of Melwood Thermoplastics Ltd., of Harpenden, where a wide variety of extrusions are produced. The plant comprises a number of extruders of the single- and twin-screw type, including Mason machines, which were specially developed originally to this company's own design and specifications, Iddon machines and a Windsor extruder R.C. 100 Mark II which has been installed especially for work on the extrusion of rigid p.v.c. and cellulose acetate butyrate.

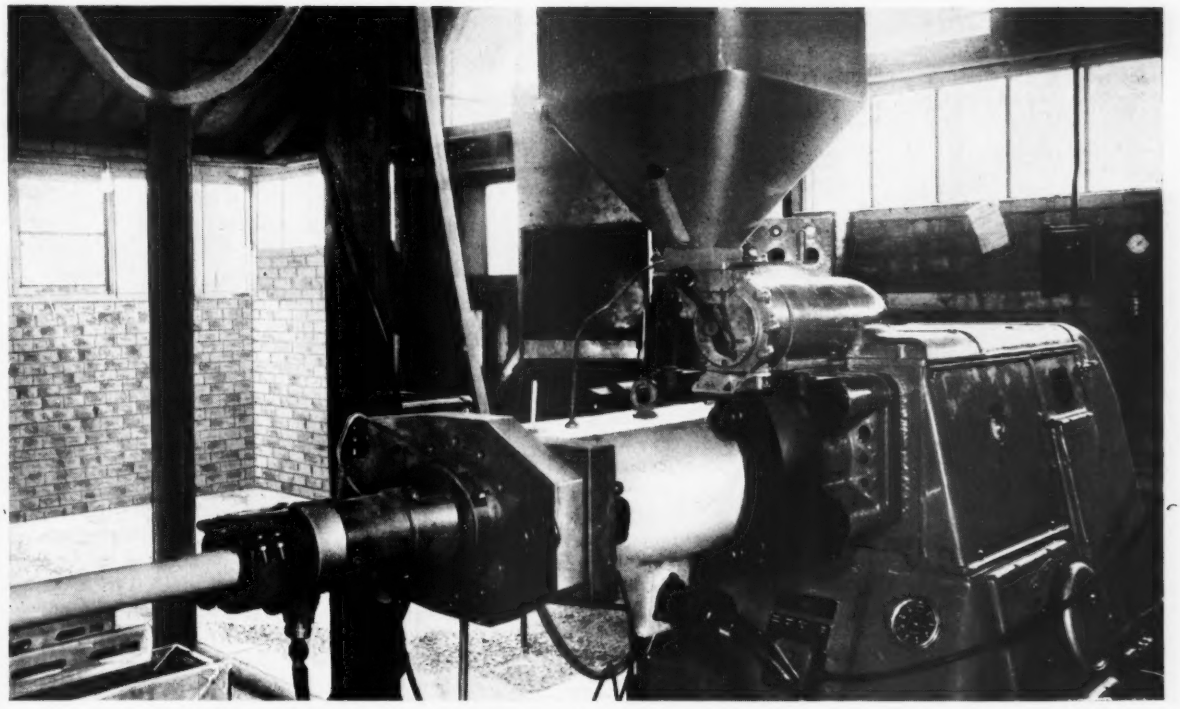
The same general set up for all types is seen in the photographs. Below is shown a Mason extruder with control panel, and on the left, behind a B.T.H. variable-speed motor of 550/1,500 r.p.m. The die-head with its heating sections is clearly visible as is the water cooling tank, the temperature of the water being controlled at between 40°-55° F. The photograph shows the production of a p.v.c. profiled beading. As with all machines an air compressor is available when making tubing, the air running at 70 lb. sq. in. being put through a reducing unit sometimes down to ½ lb. sq. in. for inflating purposes. It is also obviously available for cooling.

The most recent installation, the R.C. 100, is seen overpage together with its ancilliary equipment: 10 h.p. motor, an infra-red heating oven (fitted with two Metrovick 2 kilowatt elements) for preheating 10 lb. p.v.c. at a time, and the control panel. The tube shown extruded is of 3-in. diameter with ¼-in. wall thickness, the compound being of completely unplasticized p.v.c. Ideal uses for this type of tube include the conveyance of acids and other liquids and for use in acid-fume extraction plant. It is of interest to quote here that Melwoods are hoping to exhibit 6-in. and 8-in. tubes in this machine and in a special type which is free from lead-based stabilizer for plant where the presence of lead even in small quantity is undesirable, at the forthcoming British Plastics Exhibition. Tubes of even larger diameter are planned for production by the end of the year.

The temperature of the barrel is usually maintained at 150° C. while the die-head itself is 165° C. As to water-cooling of this thick-walled acid-piping, this is accomplished by water spray on the take-off and also by the addition of a



One of the Mason single-screw extrusion machines installed in the factory, producing a specially cross-sectioned strip of lightly plasticized p.v.c. In the photograph are also seen the control panel, a 10 h.p. B.T.H. motor, and the die-head with its manifold heating elements.



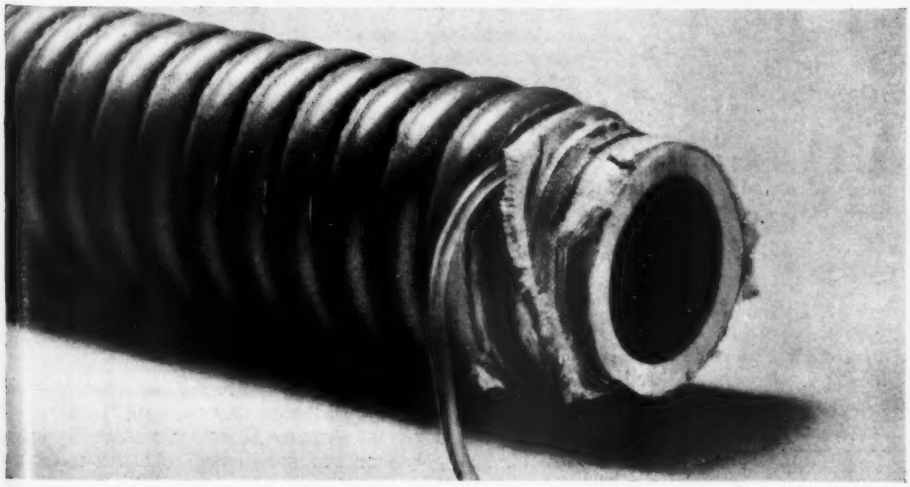
The recently installed R.C. 100 Mark II twin-screw Windsor machine. To the rear and left are seen the infra-red p.v.c. pre-heating equipment and the control panel. In the left foreground is the take-off unit of Dexion angle.

water-cooling chamber at the nozzle exit; production is at the rate of 60 lb. per hour. The take-off bank is ingeniously constructed of Dexion angle which carries a rubber-asbestos belt driven by an infinitely variable gear made by Carter Gears Ltd., of Bradford. The Windsor machine is also used for the extrusion of C.A.B. (Tenite II) in fluted rod form, which is afterwards machined into tool handles for screw-drivers and chisels. C.A.B. is also extruded for producing hammer heads. This material is now regarded as a "must" by tool manufacturers doing an export trade, since it possesses a very high impact strength, a high resistance to high voltages and is non-inflammable.

We should also mention the production at these works of a TV. frame made from slightly plasticized p.v.c., cut-off lengths of the extrusion being heated and formed to make a round-cornered rectangular shape. Of special interest, too, are the extrusions made for the "Flexatex" petrol pipe. This excellent example of the application of plastics (see below) consists basically of extruded p.v.c. tubes from ½-in. bore up to 3½ in. covered with tough fabric held in place with a firm tight spiral winding of 1/32-in. cellulose acetate extrusion. The whole is bound, again spirally, with a ¼-in. p.v.c. extrusion the edges of which are welded together, thus forming a structure of great strength, impermeable to petrol and yet quite flexible. "Flexatex" petrol piping was designed and developed by Wilkinson Rubber Linatex, Ltd., who also manufacture the complete piping from the extrusions.

The few notes given above amply show the flexibility of such well-equipped extrusion plants and the wide variety of uniform cross-sectioned structures that can be produced. There is little doubt that this relatively new industry will expand greatly, as its capabilities and the implied general efficiency and economies are realized and understood.

We are grateful to Mr. A. W. Meldrum, managing director of the company, for permission to visit his works and compile the foregoing, and to Mr. P. H. Barton, works manager, for his exposition of the plant.



A section of "Flexatex" petrol piping manufactured by Wilkinson Rubber Linatex, Ltd., cut to show the variety of p.v.c. and cellulose acetate extrusions.

The Effect of High Energy Radiation on Some Long-chain Polymers

By Dr. A. CHARLESBY*

A PROGRAMME of research now being carried out at Harwell deals with the effects of high energy radiation on the properties of certain plastic materials. The energy carried by fast neutrons or gamma rays may exceed a million electron volts per particle and, by collision with an atom in the irradiated plastic, energies of the order of 100,000 electron volts or more may be transferred to the struck atom. When one compares this enormous accumulation of energy with that required for most chemical reactions (of the order of a few electron volts only) we may expect interesting changes to take place. Indeed, certain reactions may occur which cannot be achieved by the more usual and better known chemical means.

One of the most convenient sources of such high energy radiation is the Atomic Pile, and most of our experiments were carried out in the B.E.P.O. Pile at Harwell. It should, perhaps, be emphasized that other sources of high energy radiation, such as the linear accelerator and radio-active fission products, will achieve the same type of result. The atomic pile provides a large volume of uniform radiation density of high intensity and is therefore preferred for the present stage of research.

Previous Work

Early work carried out in America on this problem was largely of an engineering character, and was intended to discover how certain of the useful properties of plastic materials suffered as a result of radiation. Tests were carried out on the changes at room temperature of a number of mechanical and electrical properties, but no theoretical study of these empirical results has been published nor have they been extended to other temperatures. At Oak Ridge, Davidson and Geib studied the effect of pile radiation on rubber, polyisobutylene, and butyl rubber. They found a slight increase in the molecular weight of rubber and a degradation of polyisobutylene. No results for butyl rubber were quoted. Dole gives details of research by Rose on the effect of pile radiation on polythene. Most of these experiments were carried out on thin films irradiated in air. As shown by the writer, oxidation effects occur on the surface of polythene when it is exposed to air during irradiation, and in these experiments surface oxidation and irradiation effects are inextricably mingled.

A considerable amount of effort has been devoted over a period of years to the effect of high energy radiation on organic compounds, particularly the lower molecular weight paraffins, alcohols and acids. This work is clearly relevant to a theoretical study of the effects produced in plastic materials and, indeed, to the processes of polymerization under radiation which have been extensively studied in America, France, Britain and elsewhere.

In what follows we shall confine ourselves to the effects observed when certain long-chain polymers are irradiated since the effects produced are then most striking. Perhaps the most interesting material for detailed study is polythene because of its simple chemical structure, the large amount of information already available as to its physical structure and properties, and the considerable changes which it undergoes when the temperature is raised.

*Atomic Energy Research Establishment, Harwell.

Polythene

At room temperature polythene is approximately two-thirds crystalline, the long molecules passing through several crystallites and the intervening amorphous regions. As the temperature rises the crystallites gradually melt until at about 115° C. (for the grade of polythene most commonly used) one is left with a viscous liquid. Polythene has excellent electrical properties, but suffers from the disadvantage that when strained at a temperature of 80° C. or above it tends to creep. Moreover, it dissolves in many organic compounds, particularly when the temperature rises. All these effects are due to the fact that the only strong bond between molecules is provided by the crystalline regions, where the molecules are closest together, and are held in position by Van der Waals forces. Close to the melting point these regions disappear, and the molecules are no longer held firmly together.

After irradiation marked changes are observed in polythene, the effect depending on the length of irradiation. These effects are best explained as due to the formation of cross-links between molecules, C-H bonds being broken by radiation and hydrogen gas evolved. As a result, free bonds are left vacant on the carbon atoms; these unite to form a new primary bond which links the molecules together. For very small irradiation doses (as defined later), less than 0.05 unit, the effect on most physical properties is small, at least at room temperatures. For grade 7 polythene a dose of about 0.05 unit produces sufficient cross-linking to join most of the molecules together to form one large molecule (namely, about one cross-link per molecule). The polymer is then no longer soluble in any solvent but swells due to the introduction of solvent molecules into the material. A small percentage of the molecules not linked into the main structure can, however, be removed. At higher radiation doses the degree of cross-linking is greater, there is very little swelling and the soluble fraction is negligible. The radiation dose required to achieve insolubility is independent of the type of organic solvent, showing that true cross-linking is produced. On the other hand, it varies with molecular weight, the shorter molecules requiring a higher radiation dosage to achieve insolubility.

Melting Temperatures

At about the same radiation dose as is required to render polythene insoluble, it no longer melts in the sense of turning into a fluid. This change occurs with remarkable suddenness. For a given small radiation dose the material can still be melted at about the usual temperature; a slight increase in radiation, and the polymer can be taken up to 250° C. or above without losing its shape or form, unless stressed. In the absence of antioxidant, oxidation may still take place, but this is a surface effect and need not be considered here.

This sudden change in polymer properties occurs at a radiation dose corresponding to about one cross-link per molecule. The whole polymer may then be considered as a single molecule, heavily branched. It is, perhaps, incorrect to describe the change as an increase in melting point. The temperature at which the crystalline regions melt is not increased—indeed, there appears to be a slight reduction—but whereas in ordinary polythene this melting releases the molecules and permits them to flow as a viscous liquid, in cross-linked polythene the cross-links hold the molecules

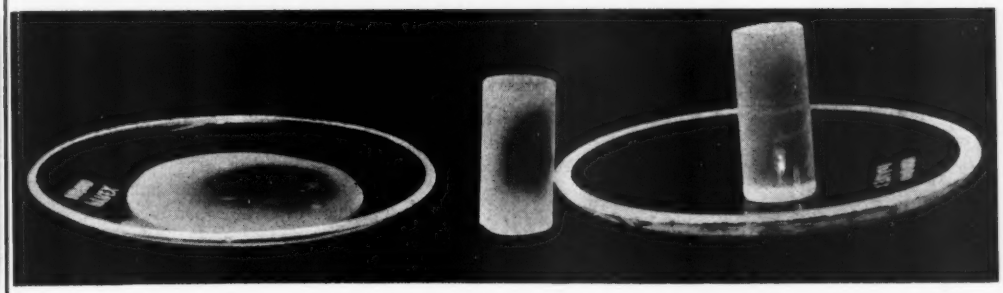


Fig. 1. — Effect of radiation on melting of polythene. Left: Ordinary polythene, which melts above 115°C. Middle and right: Irradiated polythene does not melt but becomes transparent and elastic.

together. The polymer is therefore transferred into a gel or rubberlike material. Unlike polythene at ordinary temperature this is transparent (with a slight yellow tint) and has an amorphous structure.

Mechanical Properties

Radiation is found not only to produce cross-linking in polythene but also to reduce the degree of crystallinity which is present at room temperature. This degree is relatively slight and even when 10% of the carbons are cross-linked some crystallinity remains. This may be taken to indicate that the crystalline regions are more resistant to radiation than the amorphous regions. For radiation doses between 0.05 and 8 units, this decrease in crystallinity is more important than cross-linking so far as the mechanical properties are concerned, and cross-linked polythene is therefore more flexible than the original material at room temperature. As the radiation dose is increased beyond 8 units the polymer is gradually transformed into a hard material which, at about 40 units radiation, fractures fairly readily and in many respects resembles a tinted glass. By means of high energy radiation it is therefore possible to produce a range of materials varying from a largely crystalline structure to one which is entirely amorphous, even at room temperature. With the exception of this last glass-like structure, all these show a maximum flexibility at about 115° C., the temperature at which all crystallinity disappears.

An expression for Young's Modulus (E) of a long-chain polymer cross-linked at random can be deduced by thermodynamic reasoning. For small stresses this can be written:—

$$E = 3\rho RT/M_c$$

where ρ is the density, R the gas constant and T the absolute temperature, M_c is the average molecular weight between cross-links, and for the given chain length will decrease as the amount of cross-linking or radiation is increased. Thus, according to this theory Young's Modulus should be proportional to T and to radiation dose (since the cross-linking is proportional to the radiation dose). This has been confirmed in the case of polythene except for the most highly radiated material, when the theory ceases to apply, since the distance between cross-links is then insufficient to produce the fully flexible chain assumed in the theory.

Tensile Strength

At room temperature tensile strength does not vary greatly with radiation. After about one unit of radiation there is a slight increase in tensile strength, but this decreases to its original value after about 10 units and drops to about 80% of its original value for the considerable radiation dose of 100 units. The elongation at break, however, is considerably reduced and after only one unit of radiation is about 50% of its initial value at room temperature. Further radiation decreases this elongation still more. Relatively small amounts of radiation reduce creep to a considerable extent, and recovery after deformation tends to be more elastic in character.

Ultra-violet Fluorescence

Commercial polythene fluoresces a dark purple when exposed to ultra-violet light. A short exposure to radiation results in a vivid blue white fluorescence. This is useful in revealing the presence of irradiated material in very small amounts. Infra-red analysis of irradiated polythene shows the presence of some unsaturation, due to the $-C=C-$ grouping.

Mineral Acids

The effect of mineral acids on polythene has been studied by placing rods of the material, irradiated to varying extents in these acids at different temperatures. After a few hours or days the rods were cut open and the surface and interior examined both visually and by ultra-violet fluorescence. Sulphuric acid has little or no effect even at 100° C. In boiling sulphuric unirradiated polythene carbonizes, whereas irradiated polythene suffers only a surface attack. The interior is found to be unaffected. In aqua regia at room temperature ordinary polythene is slightly attacked and after four days various rings can be observed inside the polymer, the number of rings indicating that the process of attack is complex. In irradiated polythene some attack also occurs, but this is much smaller, as can be seen from the position of these subsidiary rings. In aqua regia at 100° C. the attack

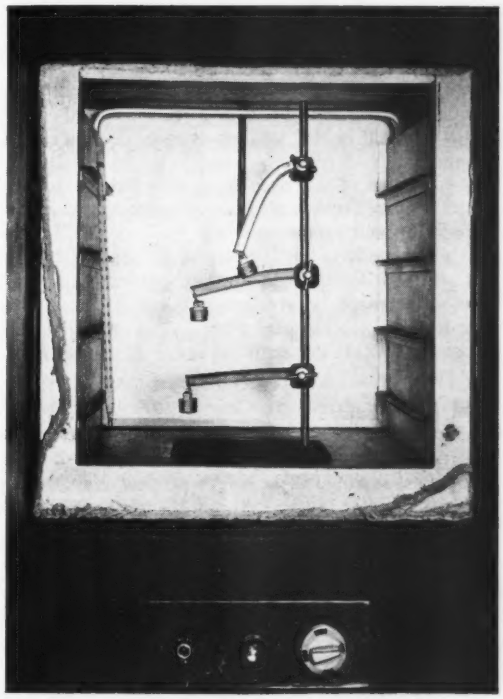


Fig. 2.—Elastic properties of irradiated polythene above 120°C. Rigidity depends on quantity of irradiation to which specimen has been subjected.

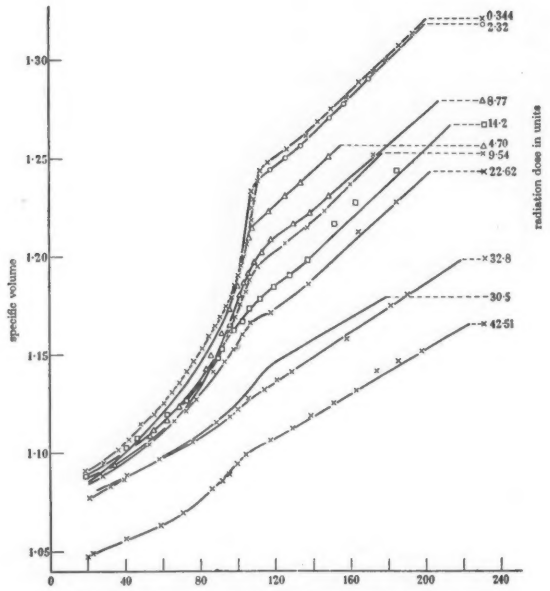


Fig. 3.—Specific volume of irradiated polythene; effect of temperature and degree of cross-linking. (Reproduced by permission of the Royal Society.)

on ordinary polythene is much stronger, but in irradiated polythene this is largely confined to the surface. Chromic acid has little effect on polythene, whether irradiated or not.

Amorphous Polythene

When polythene is cross-linked by high energy radiation, crystallinity is still retained unless the degree of cross-linking is extremely high—approaching the glasslike condition. It has been possible to produce a form of slightly cross-linked polythene which is largely amorphous at room temperature and retains considerable flexibility. This is achieved by irradiating the material close to the melting point. Under these conditions the molecules are linked at a time when they are arranged at random, and not held together by the crystalline regions. When the polythene is subsequently cooled the molecules are held in this random position by the cross-links and cannot move around in order to recrystallize. The material produced in this manner is very flexible and largely transparent (apart from a slightly yellow tinge which occurs when many organic compounds are irradiated). To prevent appreciable crystallization, the degree of linking required is not low (of the order of 3% of the carbons being cross-linked) and this is, perhaps, equivalent to some degree of over-vulcanization in the case of rubber. As a result, the degree of extension of which this material is capable is much smaller than for rubber.

Electrical Properties

The electrical properties of polythene have been studied at various frequencies and temperature, as a function of the degree of cross-linking. The polythene was irradiated in the form of rods. After radiation thin discs were cut from these, and condensers formed on opposite faces. The power factor at room temperatures is increased very appreciably at low or medium frequencies, but only for high degrees of cross-linking, which are unlikely to be used for most purposes. At higher frequencies polythene, even cross-linked to a very considerable degree, has a power factor equal to that of ordinary polythene.

The cause of this deterioration in the power factor is probably due to the presence of double bonds $-C=C-$.

Radiation Dose..	0	5	10	20	40
Percentage crystalline at 20° C.	50	42	33	15	0
Density at 20° C.	0.92	0.915	0.91	0.92	0.96
Density at 150° C.	0.78	0.79	0.81	0.84	0.89
Coefficient of Expansion $\times 10^{-3}$ (120°—160° C.) ..	0.90	0.87	0.83	0.75	0.57
Young's Modulus (10^9 dyncs/cm^2) 20° C. ..	3	1.6	1.6	2.2	4
90° C ...	0.4	0.5	0.7	1.0	2
150° C. ..	melts	0.1	0.2	0.6	2

Fig. 4.—Effect of radiation on density and mechanical properties of polythene.

Oxygen Uptake

If the radiation of polythene takes place in air, a thin surface layer of an oxide is formed. This layer is only appreciable after high radiation doses and produces a waxlike surface which can be readily removed by subsequent heating. No appreciable oxidation takes place within the body of the polymer, nor does it take place after radiation. If, however, the cross-linked polythene is subsequently raised to a high temperature (well above the usual melting point of about 115° C.), surface oxidation may take place. This can be largely overcome by incorporating antioxidants in the polymer prior to cross-linking.

Polystyrene

Polystyrene is relatively resistant to the effects of high energy radiation because of the presence of the benzene ring, which is able to absorb and damp out the available energy owing to its resonant structure. Nevertheless, some degree of cross-linking results. This has been used to determine certain properties of the polymer prior to cross-linking. This method has the advantage that the amount of linking is directly proportional to the radiation dose, so that one can prepare specimens of known relative amounts of cross-linking.

We have used this property to determine the molecular weight distribution of a polystyrene specimen. It is found that with increasing radiation dosage the amount of soluble material decreases, i.e., the sol fraction decreases. An expression has been derived for the sol fraction as a function of the degree of cross-linking, calculated on the assumption that the initial molecular weight is distributed according to a random distribution, i.e., the type of distribution one would expect if all molecules were derived from an infinite chain broken at random in a number of places. The observed distribution

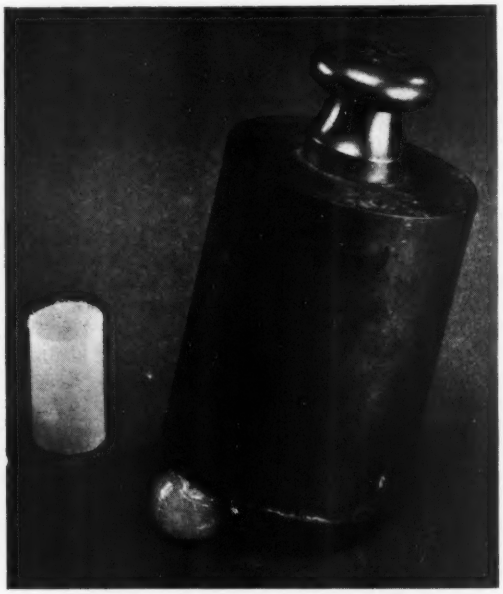


Fig. 5.—Elastic properties of irradiated polythene. (Right) Irradiated polythene at 120° C. under load. Left) Recovery after removal of load.

follows this theoretical expression very closely and disagrees completely with one based on the assumption that all molecules of polystyrene are initially of the same size. From the comparison it is possible to deduce the amount of cross-linking produced by any given radiation dose.

From the swelling of polystyrene as a function of radiation it is possible to verify the theoretical equation

$$V^{5}/_{3} = (0{\cdot}5-\mu)\, M_c^{*}/\rho v_1$$

which relates swelling volume V to M_c. From the constants of this equation and those derived from the solubility curve the average molecular weight may be determined. This is in good agreement with that derived from viscosity measurements.

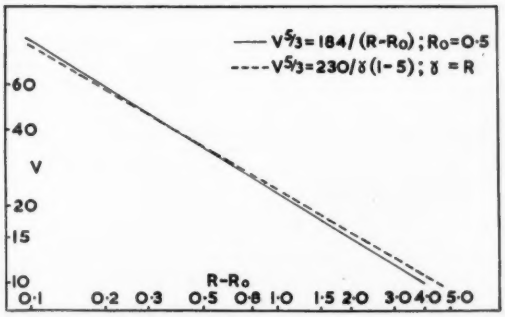


Fig. 6. Volume swelling ratio (V) and radiation dose (R) cross-linked polystyrene in benzene.

Other Long-chain Polymers

Other long-chain polymers which have been successfully cross-linked include nylon, polyvinyl alcohol, polyvinyl chloride and carbowax. Rubber, neoprene and gutta percha have also been cross-linked by pile radiation, the amount of radiation required to produce one cross-link per 100 isoprene units being about 1 unit. This is a form of vulcanization in which the degree of cross-linking is under very accurate control and is carried out without the introduction of foreign atoms or heat treatment. It is, indeed, difficult to vulcanize gutta percha by other means.

Short-chain molecules may also be cross-linked although the amount of radiation required is much higher. For example, paraffin wax may be turned into a material which is insoluble and does not melt at fairly high temperatures.

Other Processes

There are a number of materials which do not cross-link when exposed to irradiation. These include polytetrafluorethylene and polyisobutylene. The former fragments or powders under irradiation, while the latter decomposes to a fluid of high viscosity. The former process has been ascribed to the strength of the C-F bonds which, unlike the analogous C-H bonds in polythene, do not break, so that the effect of radiation is to sever the C-C bonds in the main chain, and this results in a weaker or shorter molecule. In the case of polyisobutylene, the larger methyl side groups repel each other because of their size and cause considerable strains in the main chain. Here radiation is presumed to break the C-C bonds in the main chain which are weakened by this steric hindrance. It should be emphasized that the relative resistance of various chemical bonds to high energy radiation is not necessarily the same, or even in the same order as the energy of formation in ordinary chemical processes.

Atomic Reactions

The exact amount of energy required to produce the above effect is not as yet known on an absolute scale, and both fast neutrons and gamma radiation contribute to the process. Slow neutrons are also present in pile radiation. These have themselves insufficient energy to produce any chemical reactions, but they enter the nucleus of certain atoms forming new and unstable isotopes or elements. These then emit radiation, such as gamma rays, which behave in the same manner as the gamma rays present in the pile, and increase the total effect. The doses referred to above are based on a unit taken as an exposure of 10^{17} slow neutrons/cm.^{2} plus the associated fast neutrons and gammas, and correspond to some 16 hours of irradiation in the B.E.P.O. pile at Harwell. This irradiation produces the same ionization as about 50 million roentgen. In the case of polythene, this amount of irradiation will result in approximately 0.5% of the carbon atoms becoming cross-linked or about 2×10^{20} carbon atoms per gram. This is considerably greater than the number of direct collisions which take place between the atoms in the specimen and the incident radiation, so that most of the effect must be due to secondary collisions between the atoms suffering a direct hit by the incident radiation and other atoms in the neighbourhood. The energy produced by the incident radiation is spread throughout a number of atoms or molecules in the polymer and only after an appreciable period are its full chemical effects produced. This accounts for the stabilizing effect of the benzene grouping in styrene in which the amount of primary energy absorbed is similar to that in other polymers, but the amount of cross-linking produced is much smaller, the energy being rapidly degraded until it can no longer produce chemical reactions.

In certain polymers, such as polyvinyl chloride, the effect of exposure to the pile radiation produces radioactive material whose activity decays fairly slowly. For many purposes this would be a very serious disadvantage. In most polymers the activity produced is very short-lived indeed, and the cross-linked polymer can be handled quite safely very shortly after exposure. If other forms of radiation are used to produce the cross-linking, this difficulty would not arise.

Interesting possibilities are opened by this work, both on the theoretical and on the technical side. Not only can cross-linking be produced in a number of long-chain polymers where this cannot be achieved by other means, but this can be done to any required and reproducible extent without chemical treatment, extraneous ingredients or special processing temperatures. Various parts of a single specimen can be cross-linked to differing extents, and it is also possible to carry out the process on oriented material, fixing the molecules relative to one another in a manner which is retained whatever the subsequent temperature of the specimen. On the technical side, the greater resistance to temperature and solvents is obviously of considerable interest.

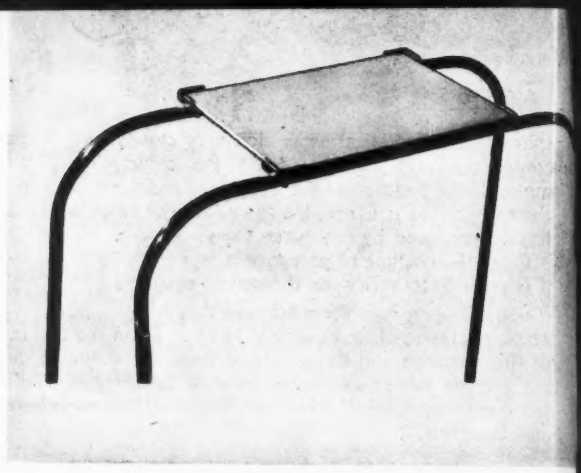
How rapidly these materials can be produced on a large scale depends largely on the development of atomic power in this country. Granted a reasonable expansion of these facilities or alternative supplies of high energy radiation, there should be no insuperable difficulty in producing these modified materials in quantity in the future, should this prove desirable. One of the main problems at the moment would appear to be the investigation of special applications for the much smaller quantities which can be obtained at present. In addition, the process is likely to be of considerable value in studying the behaviour and properties of long-chain polymers, and the differences and transitions between crystalline, amorphous solid and liquid structures. This more academic line of research is being pursued.

Amongst the recent literature published by Dr. Charlesby on this subject may be mentioned *The Swelling Properties of Cross-linked Polystyrene by High Energy Radiation*, Ministry of Supply Report A.E.R.E. M/R 1051 and *The Solubility and Molecular Size Distribution of Cross-linked Polystyrene* A.E.R.E. 1034. Also *Proceedings of The Royal Society*, March 24, 1953, pages 122-135.

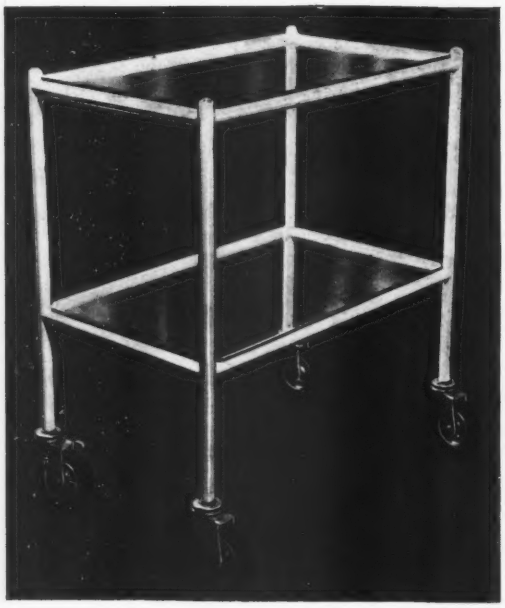
PLASTICS
IN THE SERVICE OF MAN

A pictorial review of high-quality units moulded or otherwise fabricated in Great Britain . . .

39. Hospital Equipment

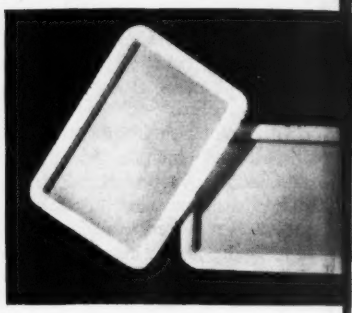


(Above) Hospital bed tray in coloured acrylic supplied by Imperial Chemical Industries, Ltd., manufactured by John and Joseph Taunton, Birmingham.

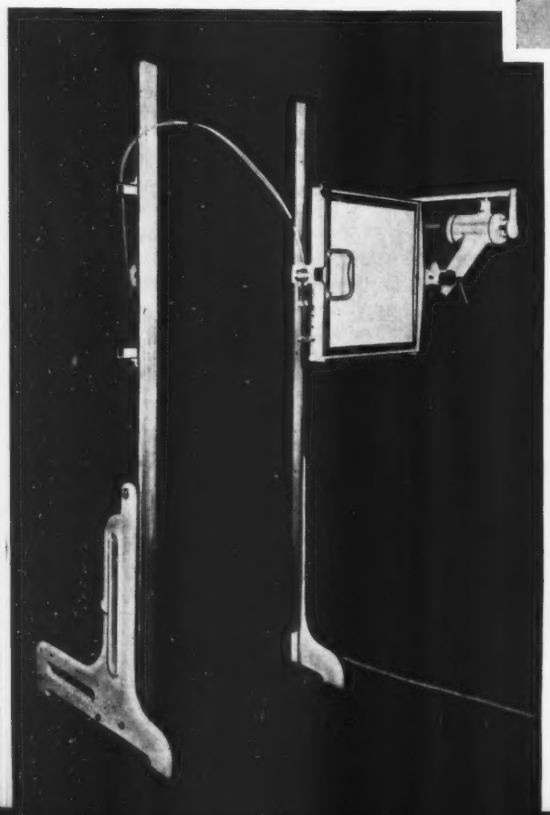


(Above) Hospital trolley, the metal legs of which are covered with Celastoid tubing manufactured by British Celanese, Ltd.

(Left) Bedside locker manufactured by W. H. Deane (High Wycombe), Ltd., incorporating Warerite materials for the working surface, which must withstand contact with spilt beverages and hot vessels.



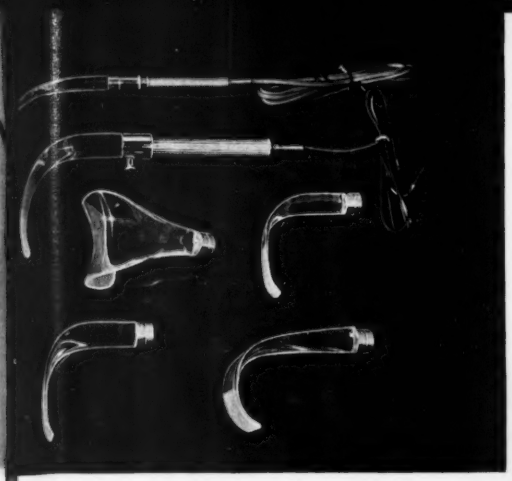
(Above) Laminated trays for hospital use, manufactured in attractive colours by Helenware, Ltd., London, W.1. Designed by Gaby Schreiber and Associates.



(Above) Dispensing unit employing Warerite material.

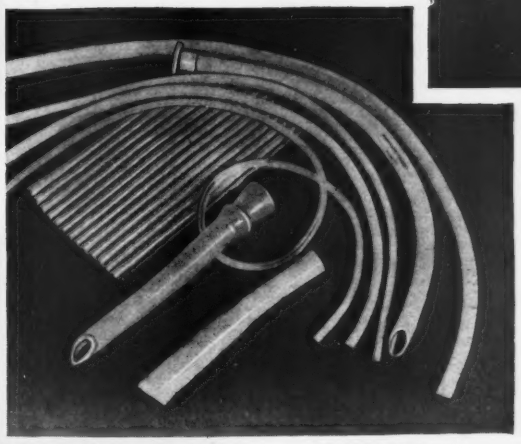
(Left) The Warerite panel with low X-ray absorption and uniform capacity is employed in the G. R. Autoscope manufactured by General Radiological, Ltd.

(*Plastics*, February, 1951.)

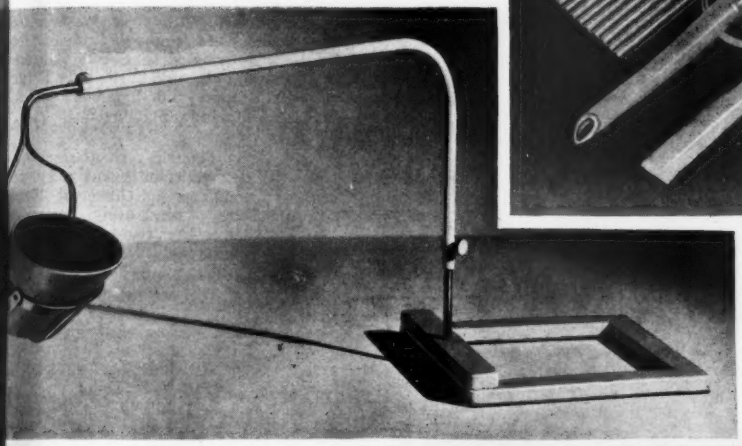


(Left) Surgical retractors, fabricated from Imperial Chemical Industries, Ltd., acrylic material, by Vann Brothers, making use of the light piping properties of this material. (*Plastics*, February, 1951.)

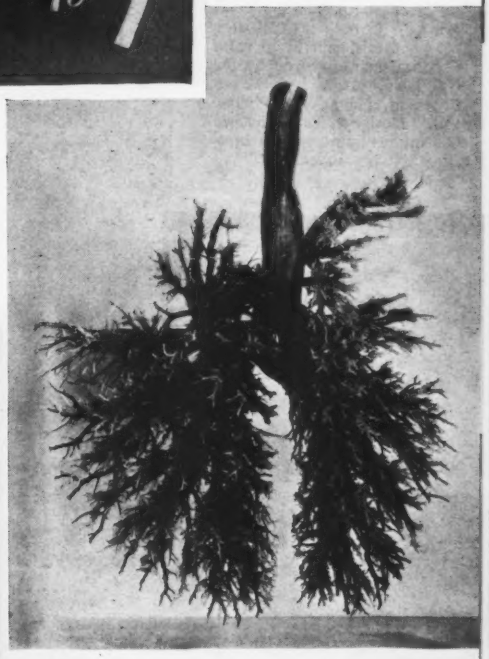
(Right) Penicillin packs, employing laminates of cellulose film and metal foil, packed by Ivers-Lee (Gt. Britain), Ltd.



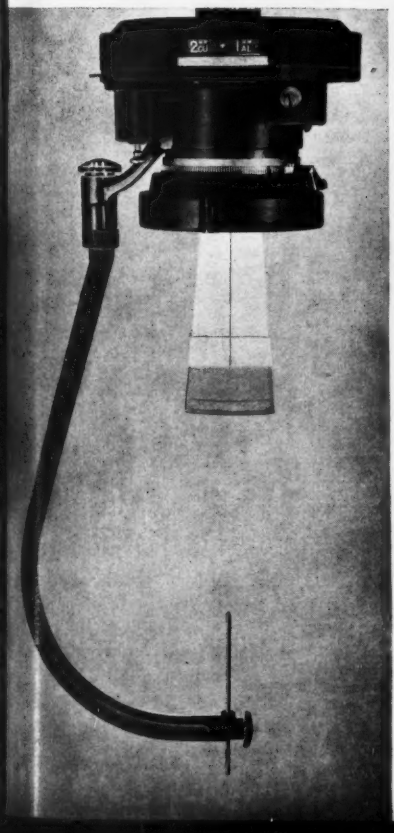
(Below) Drinking cup manufactured by Precision Products (Leeds), Ltd. The cup itself is of polythene moulded by Arthur Vizard, Ltd., Leeds.



(Left) The catheters, larynx tube and other tubes for medical purposes, are extruded by Portland Plastics, Ltd., from special vinyl polymers.



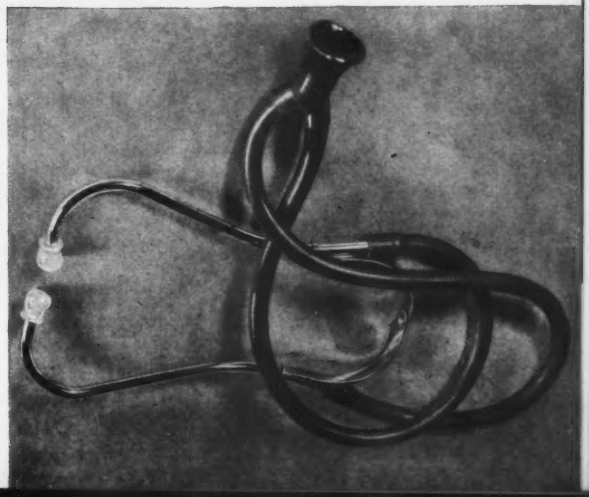
(Below) The Fulfield applicator (Medical Supply Association, Ltd.) with head fabricated from acrylic material (Imperial Chemicals Industries, Ltd.)

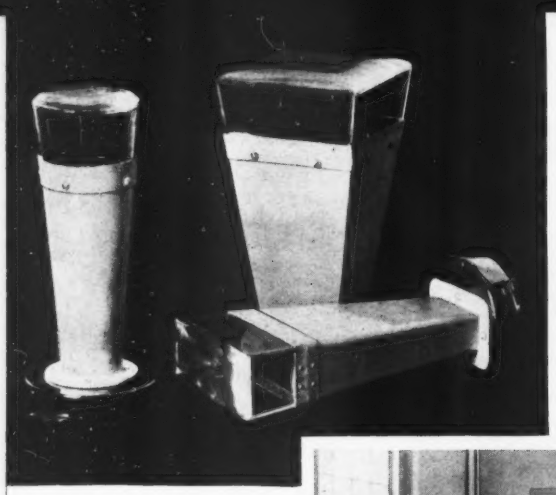


(Above) Demonstration model of sheep's lung, made by injecting Marco polyester resin, made by Scott Bader Ltd., into the lung and curing to form a solid cast.

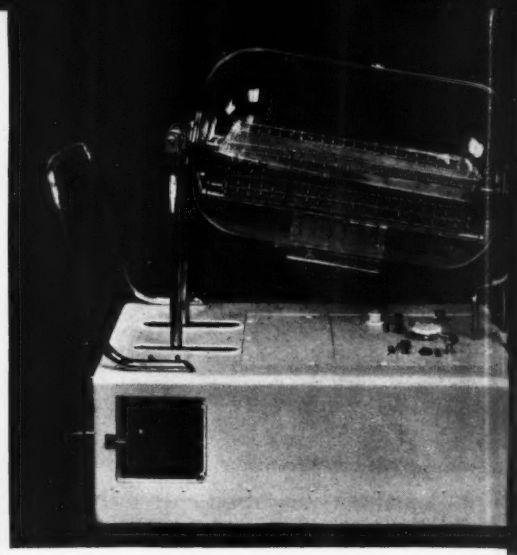
(Above) Swann Morton surgeon's case by W. R. Swann and Co., Ltd. (*Plastics*, May, 1951.)

(Right) The Helvin stethoscope, made by Hellerman Electric, Ltd., with tubing and chest pieces made in one piece of flexible p.v.c. claimed to have excellent acoustic properties. (*Plastics*, February, 1951).





(Left) Radio therapy equipment, manufactured by Arnoplast, Ltd., Glasgow, employing acrylic sheet made by Imperial Chemical Industries, Ltd.

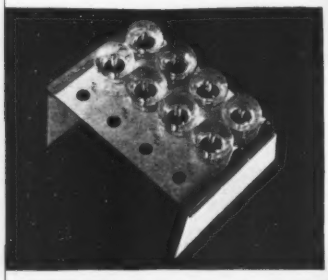


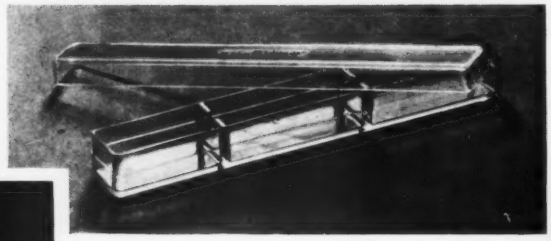
(Right) The staff servery of a well-known hospital in Surrey. Panelling and shelving in Formica, manufactured by De La Rue, Ltd.

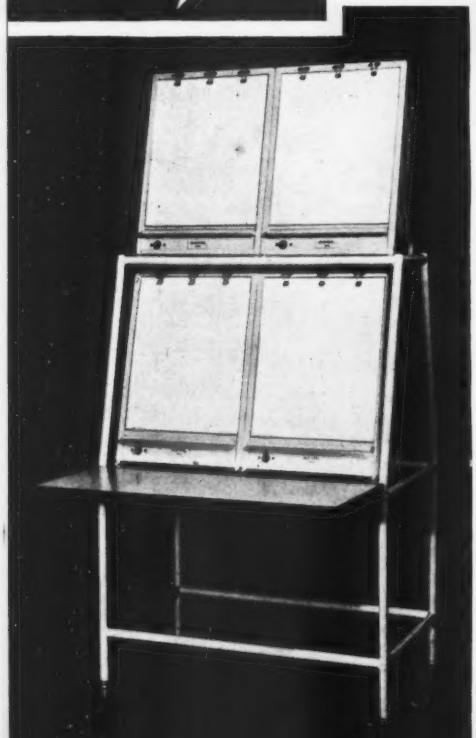
(Above) Handley-Rigg baby rocker. Manufactured by Precision Products (Leeds), Ltd., employing acrylic sheet made by Imperial Chemical Industries, Ltd., moulded by R. B. Production and Engineering Co. Ltd., Bridlington.

(Below) Container rack for hip prothesis, fabricated from Formica, manufactured by De La Rue, Ltd., by Down Brothers, Mayer and Phelps, Ltd. Designed to withstand continuous immersion in boiling water.

(Below) Electric syringe sterilizer. The heat-resistant jacket and knob are moulded by Universal Metal Products, Ltd., using melamine powder manufactured by British Industrial Plastics, Ltd.



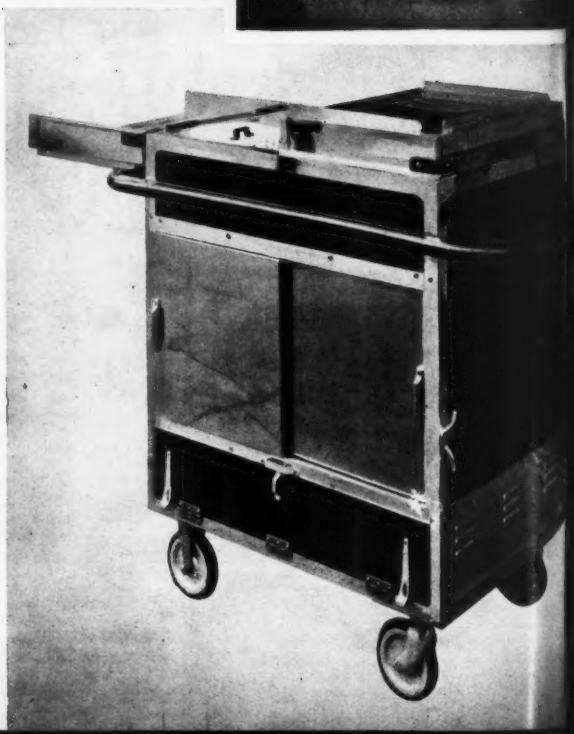


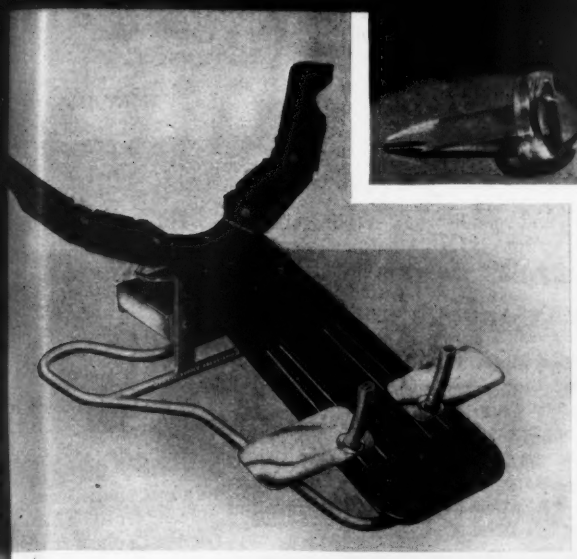


(Above) Weiss knife box produced by Universal Metal Products, Ltd.

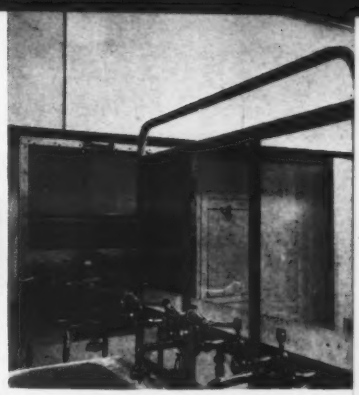
(Left) X-ray viewing screen having horizontal surfaces of Formica, manufactured and supplied by De La Rue. Ltd.

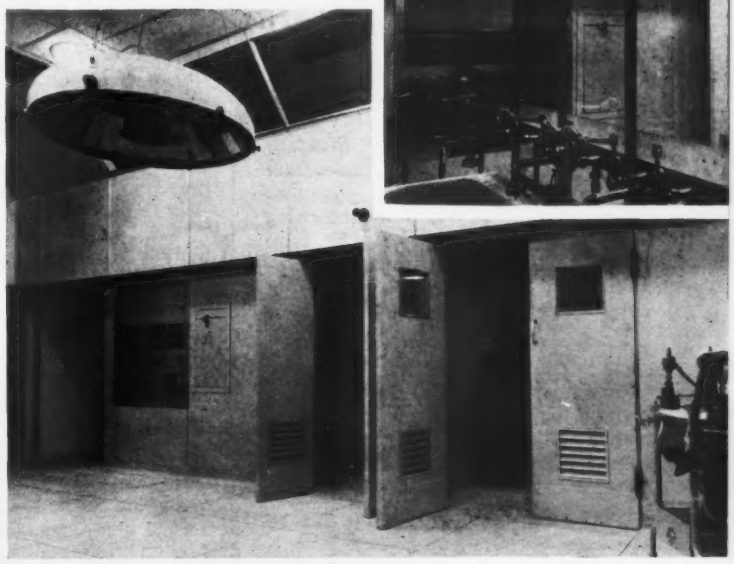
(Right) The Brownson electrically heated food service conveyor used in hospitals and manufactured by A. Browne and Son, Ltd. This unit makes extensive use of Warerite aluminium cored material. It has been adopted for the back, side and two of the front panels of this trolley because the surface does not lose its gloss and because of its excellent heat resistance.



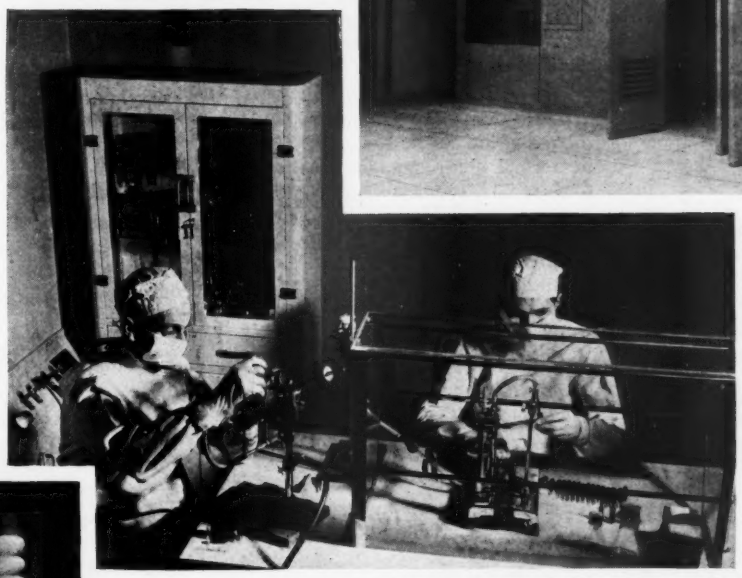


(Left) Artificial femoral head, made of acrylic material and supplied in this country by the Medical Supply Association, Ltd.



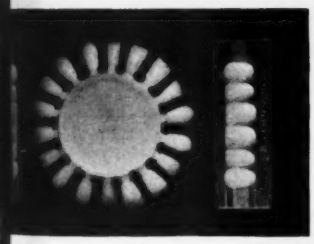


(Above) The Great Ormond child operating table surfaced with laminated plastics material. Manufactured and supplied by the Medical Supply Association.

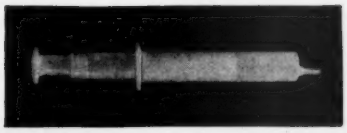


(Right) Pharmacy unit of Glaxo Laboratories, Greenford. Investigations being carried out in the sterile room. Bench surface of Formica, manufactured by Thos. De La Rue and Co., Ltd.

(Above) New Operating theatre of St. George's Hospital, London. Carried out by Firmin & Collins, the photographs above and inset top right show the applications of materials manufactured by Holoplast Ltd.



(Below) Hypodermic syringe, supplied by the Medical Supply Association, Ltd., and fabricated in nylon.



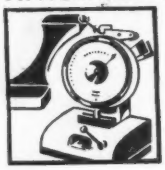
(Above) Acrylic artificial teeth manufactured by Portland Plastics, Ltd.

(Above) Holoplast partitioning in 1¾ in. panel installed in the Kingston Hospital. Material supplied by Holoplast, Ltd.

(Left) Baby changer trolley employed in hospitals. Horizontal surface of Formica laminated plastic, manufactured by Thos. De La Rue and Co., Ltd.

World's Industry Employs Plastics

MATERIALS and TESTING



Determination of shrinkage and after shrinkage.—A new German Standard has been issued on shrinkage properties of thermosetting plastics. A flat bar of 120 mm. length and 15 mm. width is presented and at least five samples from different operations are used. (*DIN* 53.464 new ed., July, 1952, obtainable through British Standards Institution.)

Quality and test standards.—G. Ehlers reviews the German standardization of plastics. He discusses in particular difficulties which have arisen lately. (*DIN-Mitteilungen*, Vol. 32, 1953/Jan./2-4.)

Mechanical behaviour and testing of plastics.—W. N. Findley gives a well-documented survey (119 references) on this subject. He deals with: stress-strain characteristics and static strength, ductility and brittleness, damping and dynamic modulus, fatigue, creep in tension and compression, stress relaxation, creep in bending and torsion, relation between static tests and creep tests, residual stresses, crazing and fracture, contact friction. (*Applied Mechanics Reviews*, 1953/Feb./49-53.)

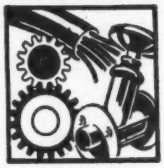
Thermal degradation of polystyrene has been investigated by P. D. Zemany, of the General Electric Research Laboratory, Schenectady, reaching results differing from those obtained by previous workers. (*Nature*, 1953/Feb. 28/391.)

Stabilization of vinyl compounds.—G. P. Mark discussed the instability of vinyl compounds at the German Plastics Conference, September, 1952. Various decomposition mechanisms, explaining polyene formation and oxidation to carbonyl groups, are compared with cross-linking which probably takes place between functional groups. (*Kunststoffe*, 1953/Mar./94-101.)

High impact polystyrene.—Report by P. M. Elliot on new developments to obtain heat and impact resistant materials of polystyrene and its co-polymers. (*Kunststoffe*, 1953/Mar./105.)

Acrylic Monomer. — A new plant recently started up in Texas by Rohm and Haas will produce acrylic monomers, including methyl acrylate, from acetylene and carbon monoxide. Replacing the older process based ethylene derivatives, the plant is the latest practical application of Dr. Reppe's work on acetylene chemistry in Germany. Price reductions resulting from this move are hoped to extend uses of acrylics to waterbase paints and soil stabilizers and conditioners. (*Chemical Engineering*, 1953/April/114.)

INDUSTRIAL APPLICATIONS

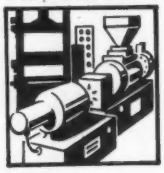


Plastics slides for machine tools. — A comparative study of the behaviour of metallic and plastic slides has been made by P.E.R.A. (Production Engineering Research Assn.). Polytetrafluorethylene appears to exhibit the lowest coefficient of friction between "plastics and plastics," "plastics and steel" and "steel plastics." (*Machine Shop Magazine*, 1953/Feb./75.)

Urea moulding for casings.—A new thermosetting plastic has proved superior to normal urea compounds, particularly for radio cabinets and clockcases. (*Materials and Methods*, 1953, Vol. 37, p. 128, Jan.) Producer: Plaskon Division, Libbey-Owens-Ford Glass Co., Toledo 6.

Calculation of flat plastics belts.—J. Bichsel has compiled comprehensive data for the calculation of Habasit textile belts with polyamide protective layers. These belts have a tensile strength of 2,000 kg./sq. cm. and are made in three thicknesses of 1.0, 1.6 and 2.5 mm. with moduli of elasticity of 2,800, 3,280 and 3,730 kg./sq. cm. respectively. The results of the calculation are summarized in nomograms. (*Technische Rundschau* (Berne), 1953/April 2/25.)

PROCESSES : MACHINERY



Fluteless drills for plastics. — W. H. Dickinson describes some recently developed sintered carbide drills. Holes 10 to 12 drill diameters deep could be drilled without retracting the drill. (*Tooling and Production*, 1953/Feb./37.)

Cutting and doming of plastic watch-glasses.—A new machine has been developed by Schütt-von Froreich, Bremen Friodr. Ebertstr. 25, Germany, which cuts out circular preforms, heats them by a hot-air blower and brings them to the desired dome shape. (*Deutsche Uhrmacher Zeitschrift*, 1953/Feb./38.)

Injection moulding of cellulose acetate.—W. Roehm gives details for the correct processing of commercial cellulose acetate and acetobutyrate. Possible mistakes and their rectification are given in tabular form. (*Kunststoffe*, 1953/Mar./125.)

Welding of thermoplastic foils.—In the thermal impulse method the foil obtains the heat required for welding through a heated thin metal band of a few mm. width. (*VDI-Zeits.*, 1952/Feb. 1/100.)

MISCELLANEOUS USES

Seven kinds of plastics pipe. — P. O'Keefe surveys the properties and uses of pipes made from polyethylene, modified polystyrene, cellulose acetate butyrate, Saran (vinylidene chloride polymers and co-polymers) rigid p.v.c., glass reinforced polyesters, and thermosetting laminates. Weight and price per foot is compared with various metals. Principal applications make use of corrosion resistance and light weight of pipes. (*Materials and Methods*, 1953/Mar./103.)

Bathtub of reinforced fibre glass has all the lustre of enamel but will not chip under heavy hammer blows. It weighs only 20 lb. (Bulletin American Cer. Soc., 1953/Mar./73.)

Discovery of polythene.—M. W. Perrin surveys the events which led to the discovery of polythene. The importance of a research team taking a leading part in preliminary evaluation and defining the lines of later commercial development is stressed. (*Research*, 1953/Mar./111.)

Mounting specimens in plastics.—K. M. G. Hosking describes a simple mould put between the jaws of a standard screw vice and heated by a gas burner. (*Mining Magazine*, 1952/Dec./342.)

Embedding of small mineralized plant fossils in polyvinyl chloride powder in a specimen mounting press is carried out in the plæo-botanical department of the Riksmuseum, Stockholm. (*Nature*, 1953/Mar. 21/516.)

Control of plastics in Germany.—A fifth communication on the control of standardized plastics in Germany has been published, including a list of firms conforming to the regulation and their trade identification marks. (*Kunststoffe*, 1953/Feb./65-69.)

Containers with sealed lid.—Foodstuffs such as butter can be kept fresh in a polystyrene container with hermetically pressed-in lid. A simple apparatus for pressing in the lid has been developed. (*Kunststoffe*, 1953/Feb./91.)

Polystyrene honeycombs to increase the production of bees-wax and honey injection-moulded plates are produced in Germany. They are said to have a long life and are sterile. (*Kunststoffe*, 1953/Mar./109.)

BRITISH INDUSTRIES FAIR 1953

LONDON AND BIRMINGHAM

AS in previous years, the Fair is located at Earls Court, Olympia, London, and Castle Bromwich, Birmingham. The companies in, or associated with, the plastics industry, who are exhibiting number 50 in total. Apart from these there are many others whose products either use plastics materials or are used in the plastics industry. For the purpose of the survey which follows, the London section of the Fair has been segregated from Castle Bromwich. This, it is felt, will assist visitors to the Fair who are interested in the plastics industry and in the application of plastics materials, and will also help those at home and abroad who have been unable to attend the Fair.

Within these two sections the field has further been sub-divided as follows:

Birmingham: (1) Hardware; (2) Building; (3) Electrical engineering; (4) General engineering.

London: Here the exhibitors have been segregated according to the industries showing at Earls Court and Olympia respectively. The Plastics Section is located at Earls Court.

So far as possible the summaries of each company's stand describe the new features to be seen at the Fair this year for the first time as well as indicating briefly the general nature of work of the companies concerned.

BIRMINGHAM - CASTLE BROMWICH

FROM the point of view of the plastics industry attention will be particularly focused on the combined exhibit organized by the British Plastics Federation in which eleven companies in the plastics industry will participate. Here will be seen examples of plastics mouldings, extrusions, laminates, and other fabricated articles. All interested in machinery will find also items of particular interest at this section of the Fair. These exhibits will range from presses both for compression and injection work, extruders and calenders, to the stands of the concerns manufacturing equipment used in the plastics as well as other industries. In this category will be included dust control apparatus, mixing machinery and hydraulic plant. In the survey which follows the stand number of each company appears by the company's title thus making for ease of reference to any item of particular interest.

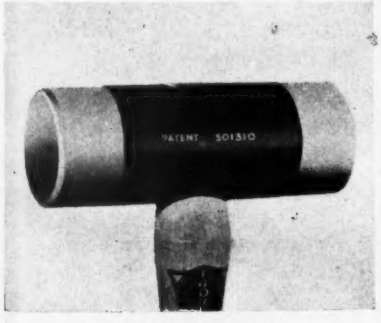
(1) Hardware

Halex, Ltd. (A.632)

On display will be the Bex range of plastic householdware including unbreakable kitchen bowls, melamine tableware for the catering industry, transparent kitchen containers, kitchen measuring equipment, plain and decorated trays and stationery and smokers' accessories.

Tedson, Thornley and Co., Ltd. (A.648)

A number of gloves dip-coated with p.v.c. will be shown for industrial and domestic purposes.



Example of Thor Hammer's Products

Thor Hammer Co. Ltd. (A.638)

To be seen this year will be hammers and mallets faced with polythene, cellulose acetate butyrate, ethyl cellulose and p.v.c. These specialized tools are well known in all industries where a firm blow is required without denting or bruising the surface which has received the blow. The weight of these tools varies from 2 oz. to 14 lb.

(2) Building

Cellon, Ltd. (B.527)

This company will be displaying a complete range of industrial finishes, including Cerric cellulose lacquers in both clear and pigmented types. Also on show will be the Cerrux synthetic finishes for application by brush, spray, or dipping and either air drying or stoving.

Jenson and Nicholson, Ltd. (B.515 and 414)

The range of industrial finishes produced by this company covers the whole field of industry. A special feature is being made of the "Liquid Envelope," the peelable packaging material. The technique is becoming widely used for the safe storage of many kinds of industrial components.

Robert McArd and Co., Ltd. (B.407)

This company will be exhibiting a full range of their manufactures of sanitary seats in colours, black, white and a wide range of self colours, including ivory, jade green, mid green, pink, primrose, blue, azure blue, hyacinth, turquoise, amber and peach. Also, a very special feature of the exhibit will be sanitary seats in marbled or shadow effects. These seats and covers give a wonderful translucent effect. All seats are fitted with a variety of pillar hinges, either moulded or in best-quality chromium plate or non-ferrous metal. The company will also display textile bobbins and custom mouldings.

(3) Electrical Engineering

B.I.P. Tools, Ltd. (C.319)

Moulded parts, examples of die hobs, and thread milling will be displayed. Examples will be chosen to illustrate the equipment and products of this company which specializes in plastic mould making. Also shown will be the electric heating of moulds.

Bakelite Ltd. (C.404)

This company produces a very wide range of materials. The stand at Castle Bromwich will be dominated by four giant test tubes to emphasize the scientific origin of Bakelite materials. In and around these will be displayed phenolic and urea resins

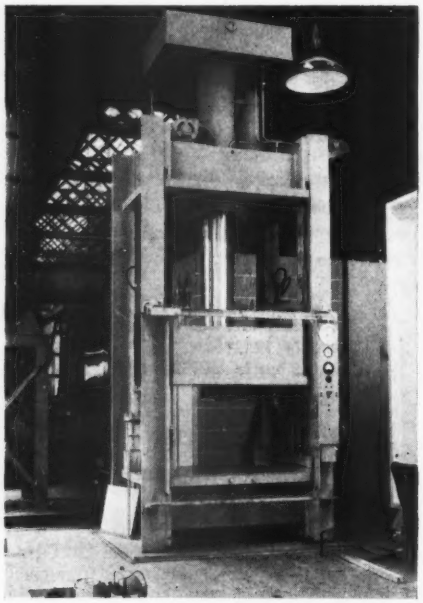
Range of shell moulds

and moulding materials, laminated sheet, rod and tube and the Vybak group of thermoplastic compounds for extrusion, injection moulding and soft and rigid calendered sheet. In addition, the Wareite range of decorative laminates for wall-panelling and furniture will also be on view.

(*Continued on page* 154)

SEEN AT THE B.I.F. 1953

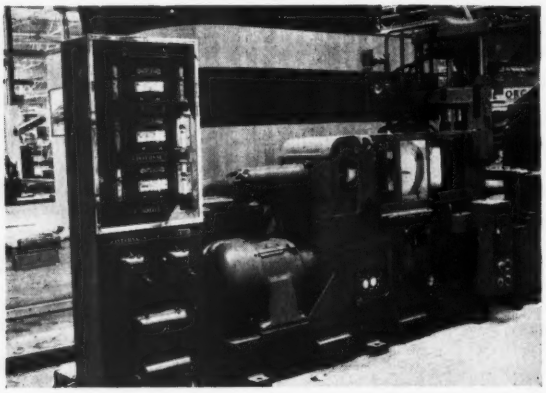
We have pleasure in publishing the accompanying photographs taken on the opening day at Castle Bromwich and at Earls Court.



(Above) Bipel low pressure moulding press by B.I.P. Engineering Ltd.

(Below, left) E.H.T. switch gear arc extinguishers by Permali, Ltd.

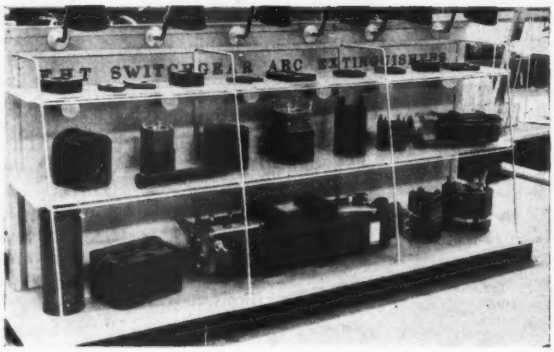
(Below, right) Improved pump unit by Finney Presses, Ltd.

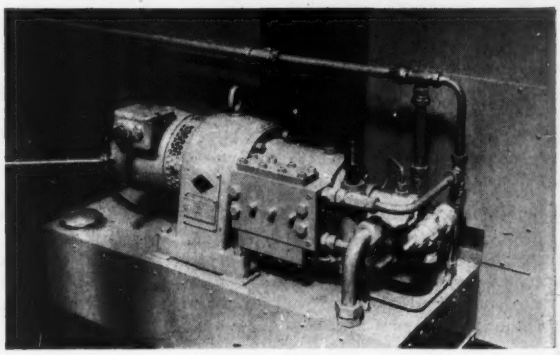


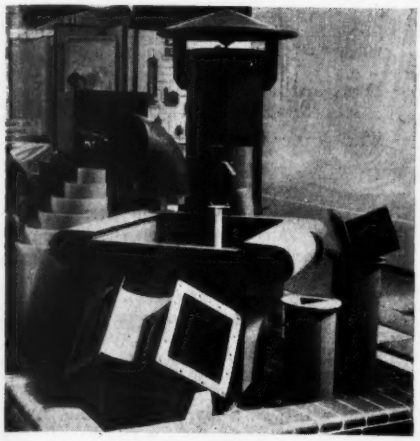
(Above) Combined display by 13 members of the British Plastics Federation.

(Left) The 4 oz. Lester injection moulding machine by Dowding and Doll, Ltd.

(Below) New 1 oz. fully automatic injection machine by R. H. Windsor, Ltd.

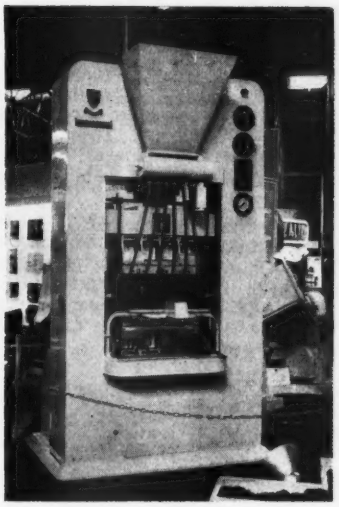


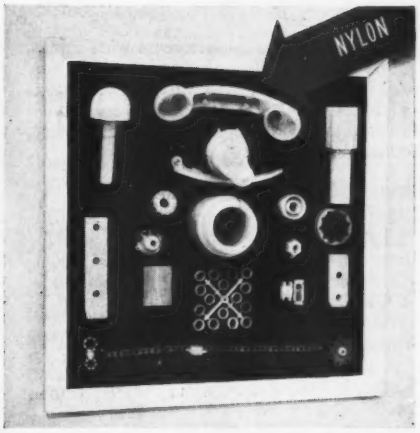




(Above) Fabrications in rigid and flexible p.v.c. for chemical plant by Prodorite Ltd.

(Below) Display by Wallington, Weston and Co. Ltd. on the Federation stand.

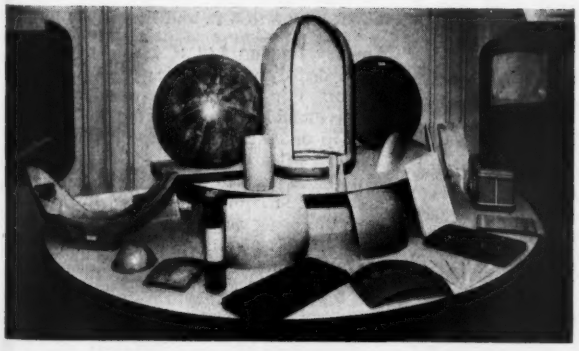


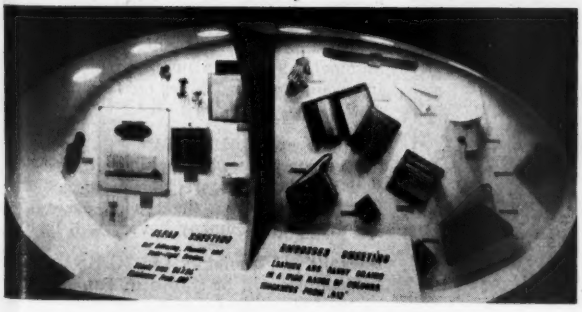


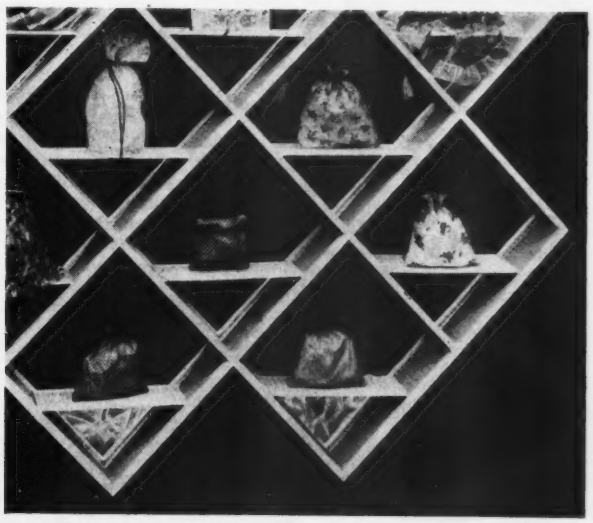
(Above) Nylon mouldings by British Moulded Plastics Ltd. and Moulded Products Ltd.

(Left) Lancastrian Model II 50 ton automatic moulding press by Foster, Yates and Thom Ltd.

(Right) Large sand/phenolic resin foundry shell moulds shown by Bakelite Ltd.







(Above) Fabrications from printed p.v.c. sheet by Storeys of Lancaster.

(Above, left) Glass fibre and Durestos fabrications by Thermo-Plastics Ltd., at Earls Court.

(Left) P.v.c. sheet, both polished transparent and opaque embossed designs by Stanley Smith and Co.

British Industrial Plastics, Ltd. (C.415 and 314)

This company manufactures a wide range of moulding powders and resins which are used in the plastics, paints, paper and textile industries. In addition, adhesives are manufactured and corebinding resins for bonding foundry sand cores.

British Geon, Ltd. (C.415 and 314)

This company's exhibit on the British Plastics Federation Stand, will set out to show how Geon p.v.c. is derived from indigenous raw materials. Typical end uses of Geon resins and latices will be shown.

British Moulded Plastics, Ltd. (C.614)

A joint exhibit showing the manufacture by British Moulded Plastics at Walthamstow and Moulded Products, Ltd., at Birmingham, will include examples of units produced for radios, refrigerators, motorcars and general engineering purposes. Of special interest will be a glass-fibre polyester resin box made for the British Everest Expedition to carry their scientific apparatus. The box is 18 in. high. Another interesting exhibit will be a large television cabinet moulded from a phenolic powder and large trays injection moulded from polystyrene.

British Plastics Federation. (C.415 and 314)

Thirteen plastics companies will be participating in the joint exhibition covering 1,486 square feet. A central circular enclosed space will house the office and telephone switchboard of the Federation, two reception rooms for the use of members, a room for stores and coats and hats, and two soundproof telephone booths. The exhibits, almost miniature stands, of the thirteen firms participating are ranged round the three sides of the Federation stand forming two-thirds of a circle. Each stand with a frontage of 5 ft-6 ft., has a showcase of uniform design with illuminated name-sign. At the back of each are desks, chairs and telephone extensions from the Federation switchboard. The exhibits will be those appropriate to the Birmingham section of the Fair, mainly concerned with the electrical, engineering, and building industries. Companies participating in this stand are as follows:—

British Geon, Ltd. British Resin Products Ltd. Coventry Motor & Sundries Co., Ltd. Imperial Chemical Industries, Ltd. The Micanite & Insulators Co., Ltd. Wallington Weston & Co., Ltd. British Industrial Plastics Ltd. E. K. Cole Limited. Crystalate, Ltd. Ebonestos Industries, Ltd. Mica Products, Ltd. Tenaplas, Ltd. Universal Metal Products, Ltd.

British Resin Products, Ltd. (C. 415 and 314)

The company is showing industrial resins, surface coating resins, cashew-nut shell liquid resins and a variety of moulding materials including phenolic, urea, cellulose acetate and polystyrene. Their range of cellobond adhesives are applied principally for bonding wood in the furniture industry. The display will be part of the Plastics Federation stand and will feature the basic materials in the lower half, the upper half showing the end products using these materials. British Resins Products, Ltd., will also be represented on the stand of their parent company, the Distillers Co., Ltd., in the chemical section at Olympia.

Chilton Electric Products, Ltd. (C.606)

Amongst the exhibits to be shown on this stand is the KUB electric dry shaver, the mouldings for which are supplied by Injection Moulders, Ltd. A new unit is also being designed, the Chilton universal shaver socket, the mouldings for which are manufactured for the company in cream urea by Hyde Plastics, Ltd., and which has created considerable interest in the hotel trade.

Chloride Batteries, Ltd. (C.301)

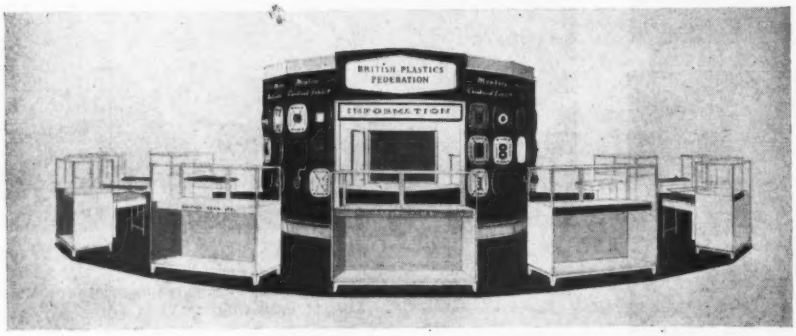
New or improved batteries for all applications will be shown on this company's stand. Amongst these will be the Exide-Ironclad battery of the latest type, incorporating Porvic separators. Porvic enables the cells to deliver heavy rates of discharge with the minimum voltage drop. Besides being virtually indestructible in service these separators also allow new Exide-Ironclad batteries to be stored for indefinite periods without risk of deterioration.

Clang, Ltd. (C.210)

Specializing in the manufacture of electrical and cycle accessories, this company will be showing several new features, including a ceiling switch, an ejector plug and a dimmer switch. Examples of these mouldings will be on display in a wide variety of standard colours.

E. K. Cole Ltd. (C.415 and 314)

New domestic products together with specialized industrial mouldings will be shown by this company on the British Plastics Federation Stand. These will include the Plastabowl specially designed for washing-up and mixing, manufactured from polythene, and a Coronation tray in urea, into the top of which a full colour picture of the Queen is moulded by a unique process. A wide range of polythene bottles will be on show.



British Plastics Federation joint stand (C. 415 and 314).

Davis and Timmins, Ltd. (C.316)

This company will again be displaying metal inserts for plastics mouldings.

Desoutter Brothers, Ltd. (C.412)

Among the many electric and pneumatic portable tools to be seen on this stand will be four new two-speed portable heavy-duty electric drills each fitted with .35 h.p. motors of new design. Other pneumatic tools include grinders, straight drills, tappers, countersinking tools, telescopic jig drills, etc.

Evered and Co., Ltd. (C.700)

Specializing in the manufacture of plastics hardware for the building industry, this company will show a representative selection of its products mounted on a panel measuring 11 ft. by 6½ ft. On display will be many new patterns of door handles, door bolts, letter and finger plates, door furniture and cupboard catches in a variety of colours.

Ether Ltd. (C.700)

The Ether exhibit this year features a number of electronically operated instruments which are designed specially for controlling temperatures such as are met with in the plastics industry. Prominent amongst these is the Ether-Wheelco range of electronically operated temperature controllers, which are designed to very accurately control the temperature of nozzles and platens, etc.

Ferranti Ltd. (C.615/514)

As in past years, this stand will include a wide range of products in the electrical field, including the Ferranti viscometer, Ferranti synthetic resin-bonded paper tubes and cylinders, etc. The tubes are manufactured from papers treated with resins of the phenolic type and are built to withstand continuous immersion in transformer oil at 90° C. Cylinders are available having diameters up to 6 ft. and lengths up to 8 ft.

Langley, London, Ltd. (C.226)

On display will be mica processed in all shapes. For the first time will be seen the Super Flexible Plate, manufactured in England to the patent specification of the New England Mica Company of America. This material is claimed to retain its initial softness and flexibility, to be tropic and moisture proof and to have excellent resistance to the action of oils, water, water vapour, dilute salts, acid and alkali solutions.

Londex Ltd. (C.722)

Manufacturers of electrical remote-control devices, their stand will show process timers, liquid level controllers, pressure switches, and a device which will automatically stop a pump supplying cooling water to a machine, on failure of the water supply.

Joseph Lucas, Ltd. (C.501)

This company will be displaying a selection of moulded parts for motorcars and aircraft, apart from the general accessories for which the company is very well known.

Micanite and Insulators, Ltd. (C.415 and 314)

Examples will be shown of Panilax lami-

nates and mouldings, extruded sleevings, injection mouldings, silicone insulation and Paxolin sheets, tubes, cylinders and mouldings.

Mica Products, Ltd. (C.415 and 314)

This company will be displaying examples of moulded and fabricated, machined and stamped, plastics for all trades. The organization specializes in injection moulding, laminated tubes, bobbins and formers and plastics and mica insulated components.

Millett, Levens (Engravers), Ltd. (C.327)

On display this year will be calculators, conversion charts, rules, protractors, nameplates, dials and many other examples of the engraver's art. The materials on which the engraving is carried out include cellulose acetate and phenolics and amongst the processes employed are stamping, blocking, pressing and chemical and machine engraving.

Moulded Products, Ltd. (C.614)

This company specializes in the design and manufacture of plastics mouldings. Examples will be shown from the wide variety of mouldings carried out for electrical and general engineering purposes and the company's products include moulded lavatory seats, motorcar facia boards and firemen's helmets.

Permali, Ltd. (C.618)

As in previous years the company is making a comprehensive display of laminated plastic materials and components designed to show the many applications of their products to the heavy electrical industry, including generators, transformers and switchgear. The exhibits include a display of arc extinguishing devices, a 132/33 kV transformer coil-end insulating ring, 54 in. in diameter and 2 in. thick, a 300 kVA. three-phase distribution transformer to B.E.A. Specification T.1 fitted with Permali end ring insulation and tapping switch parts. An unusual exhibit will be a portable Permali 500-mm. sphere gap support arch of a type recently supplied to a transformer manufacturer for routine impulse testing.

Polygram Casting Co., Ltd. (C.308)

To be seen on this stand will be a demonstration of shell moulding. The unit displayed will consist of a Polygram Automatic Moulding Machine Mark V, one of the features of which is that the operator is kept much farther away from all hot surfaces than the hand-moulding technique. This machine will turn out two half-moulds every minute and will then pass them to a neighbouring assembly station. It is hoped to make souvenir castings which can be taken away by interested visitors.

H. B. Sale Ltd. (C.319)

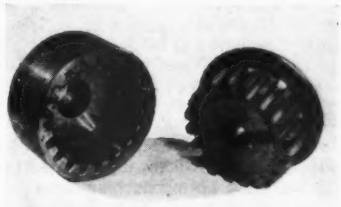
Specializing in jig and mould making, this stand will show examples of parts of moulds for plastics, with particular attention to fine detail and accurate finishing.

Tenaplas (Sales) Ltd. (C.415 and 314)

This company's display will be mainly devoted to the range of tubing and fittings in polythene and unplasticized p.v.c. The principle exhibit will be a model of an installation in polythene for a dyeworks. Also on display will be valves and taps in polythene, tubes ranging from 1 to 12 in. diameter and pressure resistant unplasticized p.v.c. units.

Tufnol Ltd. (C.310/411)

The exhibits on the stand of this company will consist of specimens of the various brands of Tufnol in the basic forms of sheet, rod and rolled and moulded tube, and a selection of engineering components produced from these forms with the usual engineering tools or specially moulded to shape during manufacture. The Tufnol components include water lubricated rolling mill bearings, slipper pads, pinion couplings for run-out tables and other items of interest to the iron and steel engineer. The pinion couplings present no re-alignment difficulties and replacement is therefore made easy.



United Ebonite and Lorival Ltd. (C.618)

A comprehensive selection of mouldings and other plastics products will be displayed on this stand. Particular attention will be drawn to calendered p.v.c. sheeting which has been produced in new quantities for special application in packaging, chemical engineering and electrical installation.

A new series of plastics extrusions in various materials will be featured. These will range from thin-walled tubes to rigid extruded tubes and rods. Amongst the injection mouldings will be the Polyfloat cold water domestic surface float of polythene. Nylon-filled compression mouldings will be on view. These combine great strength with excellent resistance to water and Lorival components in these materials are widely used in the textile and electrical industries.

Universal Metal Products, Ltd. (C.415 and 314)

A special display will emphasize the use of plastics mouldings in the electrical industry, particularly in electric meter components. Also to be seen will be moulded polystyrene battery containers, lids and vent plugs, polystyrene trims for the refrigerator industry and mouldings for a wide variety of industrial applications ranging from power transmissions to rayon spinning. Smaller displays on this stand will include nylon mouldings in general, small compression and injection mouldings for all industries, and a small display of plastic containers for the packaging industry.

Wallington, Weston and Co. Ltd. (C.313 and 415)

This company will be exhibiting on the British Plastics Federation Stand, showing moulding powders, sheets, extrusions and laminates. Amongst these will be Fromoplas H.T., which can be used as a moulding powder, for compression, transfer and injection moulding and also for extrusions. In laminated form, the material can be bonded to itself, to wood, metals and to natural and synthetic rubbers. The material has excellent dielectric properties and is resistant to corrosion.

Other examples of branded products will include Fromocene, covering special grades of p.v.c. sheeting, Fromocene L.M.A., a specially compounded sheet of a p.v.c. base primarily for packaging purposes and Fromoplas rigid p.v.c. sheets in various thicknesses and colours.

Wickman Ltd. (C.319)

On show will be machine tools of various kinds, including the recently introduced range of Wimet tungsten carbide burs. Available with diamond lapped teeth, in standard and fine cuts, in a full range of commonly used sizes, they have been successfully used in finishing moulds and dies.

Wilmot Breeden, Ltd. (C.416)

To be seen on this stand will be exhibits of mouldings for the domestic appliance industry. These include control knobs and dials, badges, cabinet name-plates, etc.

R. H. Windsor, Ltd. (C.413 and 312)

This company's stand this year will show two completely new and two improved and modified versions of standard Windsor models. For the first time will be seen the new 1 oz. automatic injection moulding machine which has been produced to meet the needs of both small and large moulders for a small, fast, and reliable machine capable of producing articles both for the general commodity market and technical mouldings of industrial value. On the stand this machine will be producing small trays in polystyrene, bearing the Coronation symbol, to be given away. The second of the new machines is the 2 oz. hand-operated press, extremely competitive in price and faster in operation than the existing Windsor 3 oz. model.

(4) General Engineering

The Airscrew Co. and Jicwood Ltd. (D.726)

Apart from standard units, this company will display this year exhibits of centrifugal fans, together with various units in their axial-flow fan range.

Allspeeds Ltd. (D.257)

Infinitely variable-speed gears from ¼ to 6 b.h.p. with working models will be one of the features on this stand. One of the most useful adaptations on show will be the variator flange mounted to the motor on the input side, and flange mounted on the output side to a reduction gear, thus providing a co-axial, in-line unit suitable for the lowest ranges of speed. Both mechanical and electrical remote-control units will be exhibited, whilst the extreme accuracy and sensitivity of speed change will be demonstrated by stroboscope. All units have a range of 9 : 1.

W. and T. Avery, Ltd. (D.523 and 420)

A new electronic scale to supply a constant flow of material in pounds per hour will be exhibited and demonstrated. This machine represents a new advance in the mechanization of industrial weighing. Instead of having to weigh individual quantities by hand, materials can be fed in and the scale sees that the correct weight flows out. Once it has been set the machine is self-correcting. The constant-rate feed scale is designed particularly for the non-stop mixing and blending of granular-type materials and will therefore be of interest to the plastics industry.

B.I.P. Engineering, Ltd. (D.322)

This company manufactures hydraulic presses and ancillary equipment for the plastics moulding and other industries. Amongst these are presses having automatic control of the moulded cycle.

Bradley and Turton Ltd. (D.237)

This year, the above's exhibit will again be devoted to plant for the plastics industry, of which they manufacture a comprehensive range. Their main exhibit will be one of their No. 984 350-ton self-contained down-stroking presses equipped with their automatic time-cycle control unit. This is a large press of the type used for the manufacture of wireless cabinets and other similar large mouldings, and it has its own pump unit mounted with the prefiller tank on the top of the main cylinder. The automatic time-cycle control unit is mounted at the side of the press and controls the whole press cycle, with the exception of loading and independent ejection, by a single push-button operation.

British Jeffrey-Diamond, Ltd. (D.528)

Specializing in mining machinery, this company will be displaying for the first time the Intermediate Atomill, a new fine grinder which can be quickly dismantled, cleaned and reassembled without the use of spanners. This machine will have special appeal to batch producers particularly in the chemical and plastics industries.

British Ropes, Ltd. (D.349 and 244)

Moulded nylon is one of the new products to be displayed on this company's stand. Nylon gears, nylon bearings, nylon washers, and a great variety of other moulded nylon parts are now being used in large quantities by textile machinery makers, by the automobile industry, and by other manufacturers. As a textile fibre, nylon is well known.

British Tyre and Rubber Co., Ltd. (D.615)

One of the new items to be seen on this stand this year will be "Pluvicor" conveyor belting which has been developed particularly for the coal-mining industry. The belting will cope with the severest underground conditions and will substantially reduce hazard from fire. The belting is of multi-ply construction and thus the edges will not unravel to cause fire. In addition it is waterproof and is highly resistant to wear, cutting, gouging and bruising. On this stand will also be shown the products of the Morgan Ebonite Co., Ltd., who are associated with B.T.R.

W. Canning and Co., Ltd. (D.207/108 and D.209/110)

Plating and polishing equipment will be shown on this stand. Two special features will be model plating plants, one originally constructed in 1927 and the other an ultra-modern version with hydraulically-operated power-driven unit. The 1953 model shows the latest design incorporating both bright nickel and chrome plating processes, together with various cleaning units. The method of transfer from one tank to another on this plant is by hydraulic operation and the carriage is operated as one unit. The model is complete with ancillary equipment and heating is by steam. Electrical heating can be arranged for standard production models.

Capon Heaton and Co., Ltd. (D.712)

This company will be displaying mouldings in thermoplastic compounds, extrusions in soft, semi-rigid and rigid materials and fabrications from sheet materials.

Christy and Norris Ltd. (D.403)

Pulverizers, ranging from laboratory models powered by 1 h.p. motors to industrial units having motors of 75 h.p., will be displayed on this stand. Specialists in pulverizing and disintegrating problems, the company also manufactures elevators, conveyors and laboratory plant.

Dallow Lambert and Co., Ltd. (D.539)

Manufacturers of pneumatic dust-control equipment, this company will show a new range of Dustmaster unit dust collectors. These will be shown at the B.I.F. for the first time. They are claimed to be particularly useful for the plastics industry.

Dowding and Doll Ltd. (D.211/112)

Three injection moulding machines will be displayed on this company's stand. The new British-built Lester machine has a 5-oz. capacity with an internally heated injection cylinder. The high locking pressure of 250,000 lb. is concentrated over the total moulding area.

A wide field of applications in all thermoplastic moulding materials including nylon is provided by the Dowding automatic fast-cycling injection machine. The third press is the Westminster ½-oz. machine, equipped with a self-contained power unit.

Dowding and Doll new injection machine.

Dunlop Special Products, Ltd. (D.623 and 522)

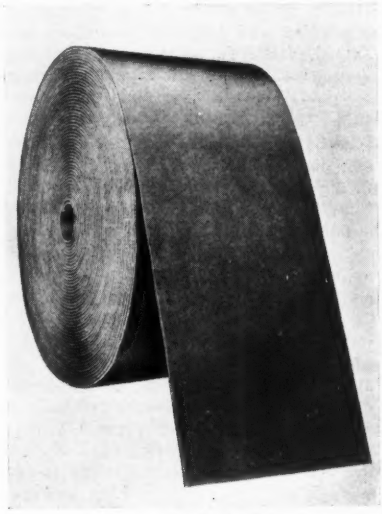
Dunlop Special Products, Ltd., will show a full range of anti-vibration mountings and flexible transmission couplings. Also to be seen will be special mouldings for intricate engineering applications demanding precision in performance and dimension. Special anti-vibration mountings for the isolation of sensitive machinery such as roll grinders will be a feature.

E.M.B. Co. Ltd. (D.505)

Air equipment, incorporating the latest developments in seals and valves, remote-control systems, automatic lubrication, etc., will be shown in units on this stand. The stand will also show examples of the E.M.B. standardized range of modern A.C. contractors from 30 amp. to 300 amp. ratings.

Empire Plastics (Birmingham), Ltd. (D.768)

Plastics moulders for the trade, this company will be showing examples of their products including handles, knobs of various kinds, caps and bushes.



Conveyor belting by Fenner.

J. H. Fenner and Co., Ltd. (D.406)

This Company is well known in the field of power transmission engineering and its stand at this year's exhibition will show a new product known as "Fenaplast," colliery conveyor belting of fabric reinforced p.v.c. which is flame resistant. Designed to eliminate the danger of colliery fires caused by underground conveyor belts catching fire, the flame resistance is achieved by the special treatment of the cords of the belt and by the coating of the belt with p.v.c. This gives a three-fold line of defence. First of all the plastic with which the belt is coated is fire resistant. Secondly, if the belt should stall with the rollers still revolving and cause the inner fabric to be exposed, the rise in temperature will cause the plastic to become molten and flow into the exposed parts of the fabric. Thirdly, the fabric is, as has already been pointed out, treated to resist the effects of fire. The belting is available up to and including 30 in.

Fescol Ltd. (D.529)

This company specializes in electro-chemical deposition and the stand at this year's Fair will show many examples of the presses developed by this company.

Finney Presses Ltd. (D.241)

Specializing in the manufacture of machinery for the plastics industry, this company will be exhibiting hydraulic control valves, high-pressure oil pumps, a hydro-pneumatic accumulator and a heat-circulating unit. The last mentioned is a self-contained unit particularly suitable for the application of heat to plastics injection mouldings. Using oil, heating is possible over a wide range of temperatures, the unit being operated by a ⅓ h.p. motor; it is mounted on a wheeled base and can thus be removed from press to press, where required.

Foster, Yates and Thom. (D.504)

The main features on this stand this year

will be the 50-ton fully-automatic moulding press and examples of the range of Rotocube dry powder mixing machines. The latter machines have been specially designed to cut down maximum time cycles and are available with drum and impellers in mild steel, stainless steel or aluminium.

Hall and Hall, Ltd. (D.729)
Manufacturers of packings, jointings, gaskets and oil seals, this company will be showing examples from the wide range of Hallprene mouldings, extrusions, and sheetings, for automobiles.

Imperial Chemical Industries, Ltd. (D.619)
A comprehensive range of plastics materials will be shown with particular emphasis on plastics for the mechanical and electrical engineering trades. Detailed exhibits will include the following—Mouldrite resins for foundry core binding; nylon, alkathene and Mouldrite moulding powders for heavy engineering and electrical engineering applications and fluon brand of polytetrafluoroethylene which having remarkable thermal properties, is an extra-special material for bushings, bearings and heat-resisting gaskets.

Ioco, Ltd. (D.701)
On display will be various applications of resin-bonded laminates for silent-running gears and electrical insulation. Also to be seen will be vinyl-coated leather cloth.

John Mills and Co. (Llanidloes) Ltd. (D.337)
This company will be exhibiting many examples of standard presses, ranging from a 6-ton bench press to a 30-ton vertical press. These presses are designed for bending and straightening metal and have application in the heavy engineering field.

Plastic Engineers, Ltd. (D.722)
This company specializes in the manufacture of mouldings for industry and will be displaying this year examples from the Nymol range of precision engineering components. These units will include bearings, oil seals, textile machinery parts, washers, valves and gears and are fabricated from nylon. Also on display will be working models incorporating nylon parts. Other exhibits will include stoppers manufactured from polythene and various containers moulded in polystyrene.

Prodorite Ltd. (D.431)
The emphasis on this stand will be chemical engineering equipment and one of the interesting features will be a mild steel tank lined with 1 mm. thick p.v.c. foil fixed to the metal surface and welded by a special process. Also to be seen will be typical ducting installations fabricated in rigid p.v.c., a plating barrel fabricated in rigid p.v.c. and a complete range of rigid p.v.c. piping of various sizes.

Rubber Improvement, Ltd. (D.142)
An interesting development to be seen on this company's stand will be Leonex p.v.c. safety conveyor belting, developed to reduce fire hazards in the mines controlled by the National Coal Board. In addition to its fire-resistant properties, this belting is impervious to water, oils, fats, acids and alkalis. Another field of development for this material lies in food manufacture of allied industries.

The company will also be showing various types of mouldings in both plastics and rubber.

Saunders Valve Co., Ltd. (D.125)
Amongst the valves and pumps to be displayed will be the new Ebonite valve in various sizes from ¼ in. to 2 in.

Temple Press Ltd. (D.721)
Publishers of specialized weekly and monthly journals and proprietors of *Plastics*, this company will be displaying examples of recorded progress and development in light metals, civil and industrial engineering, mechanized agriculture, motor shipbuilding and road transport.

Turner Brothers (Birmingham), Ltd. (D.512)
Manufacturers of special purpose machines, including power presses, moulds and dies, press tools, jigs and fixtures, this company will be showing many examples of its products. Amongst these will be mouldings which have been produced from the moulds manufactured by the company for the plastics industry and other organizations.

J. P. Udal (D.630)
This stand will show latest types of guard and hydraulic presses. A Bradley and Turton 75-ton downstroke press will be shown under working conditions, moulding cigarette boxes, and will be guarded with an interlock guard at the front and fixed wire-mesh side and back guards manufactured by J. P. Udal.

LONDON—EARLS COURT

BESIDES being the traditional home of the plastics section, the Exhibition at Earls Court will this year include sections devoted to the Commonwealth, to foodstuffs, furniture and textiles. The textile section is one of the largest ever housed at Earls Court and it is interesting to note that a number of the new synthetic fibres will be shown. These include nylon, Ardil and Terylene. Although these fibres have been shown by manufacturers in the past, this probably will be the first time when products made from them will be available on a commercial scale.

Three new sections at the B.I.F., namely caravans, prefabricated buildings and suction cleaners will be located at Earls Court. Although it is not expected that these exhibits will show any remarkable developments in the use of plastics, it will be interesting to see how manufacturers have made use of plastics mouldings and materials.

Plastics Section

The British Ebonite Co., Ltd.
This company will be showing many units fabricated from Ebonite sheets, tubes and rods and Ebonite mouldings. These will include laboratory waste fittings, machined parts and piping.

British Plastics Federation (X.4)
Besides their large combined exhibit in the electrical section at Castle Bromwich, the British Plastics Federation will have an information bureau in the Plastics Section at Earls Court to answer inquiries.

Creators, Ltd. (X.2)
The company manufactures extrusions, injection mouldings and other plastic articles made by fabrication, dipping and slush mouldings. The products to be shown will include a plastic steering wheel cover, armoured fuel piping, electrical sleeving and a plastic-covered clothes line.

Dunlop Special Products, Ltd. (X.1)
This company will exhibit a range of Duvina thin p.v.c. sheeting in a variety of colours and designs, suitable not only for rainwear, but for curtains, clothes bags, tablecloths and other things for the household.

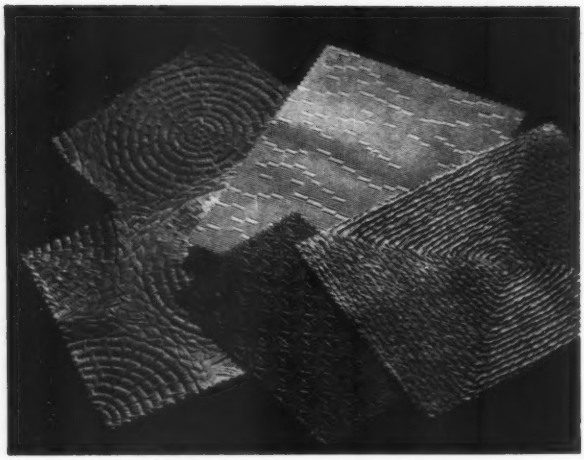
Duraplex (Plastics), Ltd. (X.5)
Apart from the extensive standard range of embossed sheeting and plain and printed film, this company will be showing some new designs, including wicker, petite and raffia. Various units will be shown upholstered in these designs, having cotton backing, particularly for use in outdoor furniture in tropical countries. Also to be shown will be materials having embossed crowns, relieved in gilt, produced for the Coronation.

The Leather Cloth Co., Ltd. (X.7)
The company is exhibiting a range of textile-backed leathercloths, based on both cellulose and vinyl surfaces.

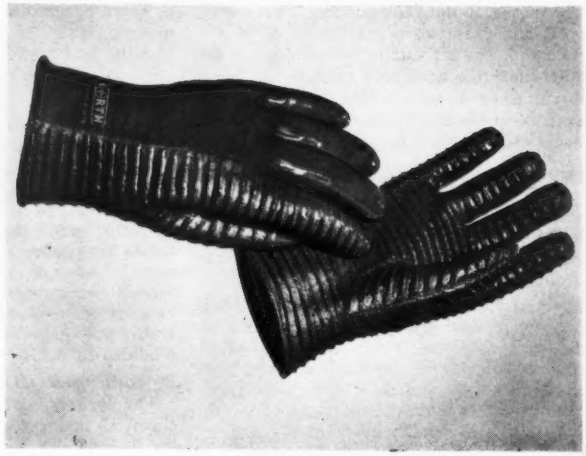
James North and Sons Ltd. (X.8)
Concerned with the industrial application of p.v.c., this company will be showing gloves and various kinds of protective clothing. In addition, visitors to the Fair will see for the first time a heavy-duty glove of fabric-supported p.v.c., suitable for use in building construction, the handling of iron and steel, sheet metal, precast concrete, etc. Also to be seen for the first time will be foul-weather clothing specially designed for people working out of doors. These garments are the type utilized by the Admiralty, Ministry of Supply and by the fishing industry amongst many others.

A special glove of fabric-supported p.v.c. has been designed for the non-slip operation of process valves and for the handling of drums and all equipment likely to be slippery.

Stanley Smith and Co. (X.9)
This company specializes in the manufacture of p.v.c. sheeting and extrusions. Their products include press-polished p.v.c., coloured and transparent, rigid p.v.c. sheet for forming, as well as Vitrothene, polythene sheeting, tubing and rod for use principally in fabrications for the chemical industry. The company also manufactures synthetic-resin adhesives.



Embossed wicker raffia and crown designs on p.v.c. sheeting. (Duraplex (Plastics) Ltd.)



Ribgrip p.v.c. coated gloves for non-slip work manufactured by James North & Sons Ltd.

Storey Brothers and Co., Ltd. (X.3)

This company specializes in the production of sheet material, particularly of the patterned type, finding wide application in the field of curtains and tablecloths.

Utilizing special techniques, attractive designs are obtained, and many of these in the Storeen range of translucent plastic curtains will be displayed on this company's stand. Amongst the advantages claimed for this range of materials are strength, resistance to fading, water and moth.

Thermo-Plastics Ltd. (X.6)

This company supplies a wide range of industries with mouldings and fabrications of various kinds. A special display will be shown this year of glass fibre laminates, including tubes, sheets, radomes, panels and moulded components. Exhibits will also be shown of the use of p.v.c. in television cabinets and a large cover moulded from Cobex, 48 in. x 40 in. x 10 in.

Furniture

Hardura Ltd. (Z.21)

This Company produces plastic coated felts in a wide range of colours and designs. Flooring material of this kind has been used for car mats. Having excellent flexibility properties and resistance to abrasion the material has also been employed as an overall floor covering for domestic use.

General

Zell-Em Ltd. (V.14)

This company will be showing a new range of products, self-adhesive plastic window stickers and self-adhesive plastic licence holders. These devices have been widely used by a number of important companies and it is anticipated that a wide demand will be experienced for Coronation units.

Textiles

British Nylon Spinners, Ltd. (R.211/318)

The greatest variety of nylon fabrics ever shown in Britain will be displayed on this company's stand this year. The 400-odd cloths will include fabrics in current production and samples of experimental cloths made from new weaving yarns.

British Rayon and Synthetic Fibres Federation. (R.423/520)

This Association, representing principally manufacturers and processers of the rayon industry, will have an impressive display promoting the use of rayon fibres and textiles.

Imperial Chemical Industries, Ltd. (R.421/518)

Here will be displayed the first all-British synthetic fibre "Terylene"—a polyester fibre originating from oil—and "Ardil"—a fibre regenerated from the protein of the groundnut.

LONDON—OLYMPIA

AS in previous years, the Olympia section of the British Industries Fair will house exhibits of chemicals, scientific and optical equipment and a range of finished products from various industries. The industries represented are brushware, chemists supplies, printing machinery, office appliances, jewellery, fancy goods, leather goods, sports goods, toys and games, musical instruments, pottery and glassware and stationery. In nearly every one of these sections applications of plastics materials and components will be seen. Here, we are only able to give brief summaries of those exhibits likely to be of the greatest importance to the plastics industry. A further description of new products seen at Olympia will be published in the next issue of *Plastics*.

It is interesting to note that a new section for boats and small craft will also be located at Olympia and three of the exhibitors will be showing boats moulded from reinforced plastics materials.

General

Cascelloid, Ltd. (A.16)

The company will be displaying its interest in packaging and exhibits will include moulded containers, shaped cellulose acetate boxes, polythene lay-flat bags and flexible polythene bottles.

Periodical Proprietors Association, Ltd. (A.12)

This stand will be a combined exhibit of British industrial and specialized journals, organized by the Council of the Trade and Technical Press. Temple Press Ltd., publishers of *Plastics*, will be represented.

Scientific and Optical

Hanovia, Ltd. (B.3)

The company will be showing a fluorescent lamp specially designed for use with a special fluid which shows up cracks or flaws in metal and plastics articles. The lamp shows up these defects as bright streaks against a dark ground.

Loma Electronic Equipment Ltd. (B.29)

This company specializes in metal detection and will be exhibiting a new machine, the type 1A Metaltector, suitable for the inspection of plastics material prior to calendering, extrusion and injection moulding. With the aid of this machine, metallic impurities are readily detected. A control unit operates a relay to give visual and audible warning and can also be converted to stop the machinery.

Stabilag Co. Ltd. (B.38)

Infra-red plant heating will be one of the features at this company's stand. This method of heating has many applications in the chemical and plastics industries, being effected by heating jackets which have temperature ranges up to 1,000° C. Thermo-couples can be connected to a thermometer controller and thus ensure automatic control within accurate limits.

Also to be shown will be a rubber-lined electric jacketed tank which will have a broken section to show the interweave of the heating element.

Chemicals

W. J. Bush and Co., Ltd. (D.23)

These manufacturers of perfumery compounds and fine chemicals have recently brought out Plastadors, a series of preparations intended to mask the odours of plastic materials.

Tilting pan with Stabilag heating jacket.

cresols and xylenols, and plasticizers, including trixylenyl phosphate, having low volatility and freedom from odour and used extensively in p.v.c.

Distillers Co., Ltd. (D.7/12)

This stand will give a general presentation of the products of the companies in the Distillers Group. These include, British Geon, Ltd., manufacturers of vinyl resins; British Industrial Solvents. Ltd., manufacturers of organic solvents and plasticizers; British Petroleum Chemicals, Ltd., manufacturing chemicals from petroleum, and British Resin Products, Ltd., manufacturing synthetic resins, adhesives and moulding powders. Both British Geon, Ltd., and British Resin Products, Ltd., will also participate in the combined exhibit of the British Plastics Federation at Castle Bromwich.

Grist Plastics, Ltd. (D.29)

The field covered by this company, which is one of the Dohm Group, includes the manufacture of reprocessed cellulose acetate moulding powders, cellulose acetate optical sheet and the production of moulding powders from reprocessed polystyrene polythene, p.v.c., etc. The company specializes in the production of metallic finishes including silver and bronze. An associate company, A.E.R. (1938), Ltd., of Enfield, carries out a metallization process of particular interest in electrical applications.

Shell Chemical Manufacturing Co., Ltd. (D.11)

On this stand will be seen some chemical products derived from petroleum, including solvents, plasticizers and synthetic resins. Of particular interest are the Epikote epoxy resins.

Vinyl Products, Ltd. (D.10)

This company manufactures a series of synthetic resin emulsions and solutions based on polyvinyl acetate, methacrylates, polystyrene and various copolymers, for use in coating materials, textiles and leather finishing, adhesives and flooring compositions. The company also manufactures Vinamold, hot melt compounds for making flexible moulds.

Watford Chemicals Co., Ltd. (D.38)

This company manufactures emulsifiers, plasticizers, and various other chemicals used by the plastics industry. Other products include pentaerythritol and some thermoplastic resins.

Chemists' Supplies

P. B. Cow and Co., Ltd. (F.17/22)

Li-Lo rubber and plastics products as well as p.v.c. sheeting will be shown by this company.

Manesty Machines Ltd.

Manufacturers of chemical and pharmaceutical machinery, this company's stand will include examples of rotary tablet devices, oscillating granulators, pelleting presses and tablet compressing machines. Many of these machines of course are employed by the plastics industry, and are particularly valuable where absolute accuracy is necessary.

T. J. Smith and Nephew, Ltd. (F.10)

A product to be shown is Glassona, a lightweight plastic splint material which is permeable to X-rays and completely washable.

Printing Machinery

Funditor Ltd. (G.42)

This company will be exhibiting in the printing section and amongst other items will be shown a new pneumatic blocking press, which, by the application of electrical heat which is automatically controlled, will permanently mark plastics materials in many colours through colour foil. Pressure can be pre-set and the machine can be run on an automatic or semi-automatic basis if desired.

Also on display will be the Supersaw, which, having new attachments, is suitable for the trimming and cutting of plastics sheets and mouldings.

Gayler and Hall, Ltd. (G.8)

A display of silk-screen printing equipment will be seen on this stand. Various special machines and printing frames have been designed specifically for use with plastics materials and articles.

Boats and Smallcraft

This is a new section of the British Industries Fair organized with the Ship and Boat Builders National Federation and the British Internal Combustion Engine Manufacturers Association. Three of the exhibitors will be showing boats constructed from reinforced plastics materials.

Boats and Engines, Ltd. (H.30)

This company was one of the first to manufacture a fibreglass reinforced plastics boat and they will be showing their dinghy at this year's B.I.F.

Fairey Marine, Ltd. (H.10)

A boat which has gathered for itself a considerable reputation is the 7.R.A.R.A. English 12-ft. Firefly O.E. dinghy. The ¼-in. moulded hull employs resin-bonded veneer for its construction. Other craft manufactured by the same company also uses this type of construction employing synthetic resins.

Southampton Launch and Boat Co., Ltd. (H.9c)

The only rival in Great Britain to fibreglass in moulded-boat construction has been Durestos resin-bonded asbestos felt. The 10-ft. 6-in. inboard motor launch manufactured by this company is the first to employ this method of moulding plastics boats.

W. and J. Tod, Ltd. (H.8)

A 9 ft. rowing outboard dinghy and a 12 ft. lugger sailing dinghy will be shown by this company. Both boats are made from fibreglass reinforced plastics. The first is a completely new design in which hull, gunwale and seats are all of moulded resinsglass. The earlier 12 ft. dinghy has had great success in the export market.

Office Appliances

Hartley Electromotives, Ltd. (J.25)

In collaboration with their associate, Duratube and Wire, Ltd., this company has extended its range of p.v.c. insulated wires and cables. A new type, for house wiring purposes, takes the form of the traditional insulated single conductors with a tinned copper braid and p.v.c. sheathed with a tinned copper braid superimposed over the sheath. The advantages of this type of cable are ease of handling, flexibility, and mechanical strength. Duratube and Wire, Ltd., also manufacture equipment wires particularly suited to the electronic field and also mains leads.

Rejafix, Ltd. (J.1)

This stand will show a complete range of marking and printing machines from hand-operated to fully automatic models. The latest fully automatic model has output capacities of up to 7,000 per hour.

Jewellery

British Vacuum Flask Co., Ltd. (L.316)

A new product in this company's range of containers and picnic ware is the Freezheat food jar of half-gallon capacity in which the vacuum flask is encased in a series of threaded urea mouldings, with a handle of extruded p.v.c. Another new product is the Servapic table picnic case unit which can be unfolded to serve as a table. Two large urea mouldings are employed to make the two halves of the case.

Happé Products, Ltd. (L.602)

This company makes artificial ornaments using resins, and the stand will include some interesting objects employing this technique, including jade idols and ear-rings.

Chinese God in imitation jade (Happé Products, Ltd.)

Aberdeen Combworks Co., Ltd. (M.56)

In addition to combs of polystyrene and cellulose acetate, this company is now manufacturing combs from nylon. Other products include toy tea-sets, egg cups, egg spoons, trinket boxes, bathroom tiles, beakers, and 12-in. rules.

Combex, Ltd. (M.10)

This company will be showing new items in novelties, toys and fancy goods moulded in plastics. They employ a process which gives a lustrous metallic finish to moulded articles.

Dorset Light Industries, Ltd. (M.6)

One of this company's products, the Flamingo cigarette lighter, has been sold in large quantities abroad, particularly in the U.S. Of ingenious design, the unit incorporates several intricate mouldings and is available in a variety of colour combinations.

D.L.J. Flamingo lighter.

E. R. Holloway, Ltd. (M.70)

Manufacturers of combs and fancy goods, their stand this year will include examples of sun-glasses, manicure sets, vanity cases and welded p.v.c. containers of various kinds including mirror and comb cases.

Jarrett, Rainsford and Laughton Ltd. (M.45)

This company manufactures various units for household use in plastics materials. Included amongst these are tea plates, fruit dishes, cups and saucers, soap boxes, tooth brush holders, and a variety of other useful articles.

Jekmoth Home Store Ltd. (M.50)

This company employs p.v.c. sheet material for a variety of applications. Amongst these are bath caps and make-up capes for women, ladies' raincoats, and the now-familiar garment bag for protection against attack by moth.

Mendle Brothers Ltd. (M.72)

Specializing in compression and injection moulding, this company will be showing a number of new designs in the hardware, household and fancy goods fields. Mouldings range from salt-spoons to bath racks including all kinds of household units. New exhibits will include a plastics dust pan, a liquid container suitable for use in refrigerators and a milk order disc which can be left on the top of the milk bottle to indicate how much milk is required.

Newey Brothers, Ltd. (M.11)

Transparent cellulose acetate containers are employed by the company for display boxes of hair-grips, pins, etc. Other plastic products include the flexible plastic hair curler, now also made in miniature for dolls, and a ring comb moulded in polystyrene in a number of colours.

Printac Ltd. (M.34)

This company will display embossing equipment suitable for use in the plastics industry. One such machine, the Giftmark, can be used to print on p.v.c. and also can be used in conjunction with curved surfaces, such as are to be found on fountain pens, tooth brushes, toys and spectacle frames.

Scintellex, Ltd. (M.63)

This company which is part of the British Xylonite Group will be showing a number of plastic novelty products in mother-of-pearl and metallic finishes. Other new items include a small sewing kit and children's hair slide grips.

Taylor, Law and Co. Ltd. (M.6)

Amongst the products to be shown on this stand this year are cake markers and icing pens fabricated from plastics.

Tedson, Thornley and Co. (M.91)

This company will display dip-coated goods similar to those shown on its stand in Birmingham.

Universal Plastics, Ltd.

This company manufactures tableware, trays, fancy goods, toys and other goods from both thermoplastics and thermosetting materials.

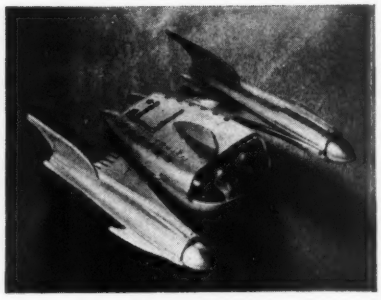
Optima Manufacturing Co., Ltd. (N.9)

The company manufactures a range of picnic baskets and cases all of which make extensive use of moulded plastics. Plates, cups, saucers, etc., used by the company are supplied either by Brooks and Adams, Ltd. (Bandalasta) or by Lingalonga. A sling case for children taking lunch to school is made from cotton-backed plastic material and includes two plastic beakers.

G. W. Scott and Sons, Ltd. (N.1)

These manufacturers are the oldest makers of picnic ware. Their most recent products include a race-hamper which is illustrated and which includes two plastics food boxes.

Race-hamper (G. W. Scott & Sons, Ltd.)



Space-ship toy (O. & E. Kleeman, Ltd.)

Stationery

Spicers, Ltd. (O.14)

A new thermo-plastic binding method is said to be the biggest advance in duplicate book-binding technique in the last 25 years. It allows books to be opened absolutely flat without danger of broken backs or separation, each perforated sheet tearing out with a clean edge.

Toys and Games

Grovewell Ltd. (Q.2)

This Company employs considerable quantities of plastics materials in the manufacture of toys. Many of these involve ingenious mouldings such as a miniature tank which fires bullets. Other products designed for domestic use include polythene cubes for freezing water in refrigerators and food savers, polythene packs designed for protection of food in refrigerators and sandwich bags.

O. and M. Kleemann, Ltd. (Q.85)

Although this company is a large producer of plastics moulding powders their exhibits at this year's B.I.F. will be restricted to their toy productions. Among the latest products to be shown there is a space "explorer" air liner and a detailed model of a battleship.

Lines Brothers, Ltd. (Q.98/100)

This company and its associates are one of the largest toy producers in this country They make extensive use of plastics, particularly injection mouldings, in the construction of their toys.

L. Rees and Co. Ltd. (Q.80)

Manufacturers of toys, games and domestic wear, this company will be exhibiting examples of their products employing plastics moulds. Amongst these will be special lightweight dolls, jointed and with sleeping eyes.

Rovex Plastics, Ltd. (Q.99)

These plastics moulders are well known for the precision-moulded toys, particularly train sets, which they produce. They are now associated with Lines Brothers, Ltd.

D. G. Todd and Co., Ltd. (Q.65)

This company will be exhibiting standard ranges of dolls and novelties and specializes in the manufacture of plastics toys and other injection mouldings.

Vogue Manufacturing Co., Ltd. (Q.68)

This company manufactures a range of toys and novelty articles injection moulded from plastic materials.

LETTERS TO THE EDITOR

Correspondents are reminded that a stamped and addressed envelope should be enclosed in all cases where a personal answer is desired. It is understood that any letter received may be published at the discretion of the Editor.

Vinyl Polymers in Surface Coatings

SIR,—We were very much interested in the item in the March, 1953, issue of *Plastics* entitled "Vinyl-type Polymers in Surface Coatings," by W. A. Edwards. We thought you and Mr. Edwards might like to know that the 1952 consumption of water-base latex paints in the United States was approximately 35 million gallons, instead of the 10 million gallons Mr. Edwards mentions. It may not be that all the water-base paints use styrene-butadiene but by far the larger proportion do so. In fact, more than one-half of the styrene-butadiene latex produced in this country goes into latex paints. The error in estimating U.S. consumption is easy to understand, for the business has grown tremendously in the past four years with consumption being 5 million, 9 million, 20 million and 35 million gallons per year from 1949 through 1952. Latex paint sales for 1957 are forecast at 60 million gallons.

In another part of Mr. Edwards' article he mentions the use of polystyrene as a vehicle for zinc dust paints, and refers to the work of Dr. U. R. Evans and Dr. J. E. O. Mayne. We would appreciate your letting us know where that work was published.

MONSANTO CHEMICAL COMPANY.
Texas City, Texas, U.S.A.

Plastics Conductor Tubes

SIR,—We are the manufacturers of the Wrekin grain and fertilizer drill, and it has occurred to us that some form of plastic material could be utilized for the conductor tubes from the grain and fertilizer sewing mechanisms to the coulters. At the moment these are supplied in rubber, which does withstand the corrosive action of the fertilizer but has some disadvantages which we think would be overcome by the use of plastics. The tubes are 16 in. long and taper from $1\frac{7}{16}$ in. in diameter to $1\frac{1}{4}$ in.

We should be extremely grateful if you can supply names and addresses of firms that might be interested, as you can imagine we are entering a field of which we have limited knowledge and are anxious to contact the correct people to help us.

THE JAMES CLAY (WELLINGTON), LTD.
Ketley, Wellington,
Shropshire.

[Editor's Note: Examination of the feeding mechanism makes us believe that a tapered tube is not necessary; indeed, for the sowing of say hygroscopic fertilizers such as ammonium sulphate a tapered tube narrower at the bottom end might prove a disadvantage. Our suggestion is an extruded tube of p.v.c., polythene or other flexible or rigid type.]

Nylon Block.

SIR,—We should be very much obliged if you could kindly advise us of any companies from whom we might obtain nylon in block form.

E. SYDNEY HEATH.
Sneyd Mills,
Burslem, Stoke.

Bag-making Machine

SIR,—We are interested in the reference to the Rediweld type W.T.E. bag-making machine on page 127 of the April issue of *Plastics*, and should like to get in touch with the manufacturers, if you would be kind enough to supply their name and address.

MARDON, SON AND HALL, LTD.
Temple Gate,
Bristol, 1.

[Editor's Note: The manufacturers of this bag-making machine are Rediweld, Ltd., 15-17 Crompton Way, Crawley, Sussex.]

Gloves for the Bakery

SIR,—Will you please be good enough to let me know who manufactures plastic gloves suitable for bakers to use when handling extremely hot bread tins.

BLAKEY'S FOOD CO., LTD.
Hungate,
Lincoln.

Plastic Bottles for Liquid Shampoo

SIR,—We have a client who is considering a new container for a liquid shampoo for ladies and we wonder whether you can put us in touch with a possible source of supply for these. The plastic bottles would be made to a special attractive shape, and any help you can give us on this matter would be very greatly appreciated.

STOWE AND BOWDEN, LTD.
3 Parsonage,
Manchester, 3.

Materials for Reinforced Plastics

SIR,—We would be much obliged if you could give us the addresses of manufacturers who could supply the following:

Glass-mat as reinforcement for our running production of polyester pieces, preferably Garand, Epon or Silan treated.

Polyester resins similar to Vibrin 114 and 117 made by Naugatuck, Division of United States Rubber Co., U.S.A.

The mat is to be used for the production of trays with approximately 40% fibre content, and a thickness of the cured products between 1.6 to 2 mm.

NORDISK FORMSTOFF A/S.
311 Kr. Augusts gt.,
Lillestrom, Norway.

Technical Research Organization?

SIR,—We should like to know if there is a plastics association, similar to the British Non-Ferrous Research Association, who deal with technical queries on plastics. We have just acquired a plastics machine and we feel that a lot of the troubles we have experienced could be easily overcome with the help of such an organization.

BARNET INSTRUMENTS, LTD.
Bath Place,
Barnet, Hertfordshire.

[EDITOR'S NOTE: There is no such organization yet. On the other hand we can put the inquirer into touch with consultants with experience of most of the problems.]

Plastic Shoes

SIR,—We noted in the April issue of *Plastics*, pages 110-112, the plastics shoes manufactured in England. We should very much like to begin business with the manufacturers and we shall be very much obliged if you will kindly let us know the addresses of the same.

FARRIS AND PRONZATO.
Via Felice Cavallotti 24,
Valenza, Italy.

Stock Moulds

SIR,—We would be very much obliged if you would advise us of some ready-made moulds, or if we could obtain any moulds to be purchased or hired (second-hand or new) in England, to be used on any of the following:—

1. Hupfield injection plants.
2. Van Dorn Iron Works injection plants.
3. Windsor SH3 injection plants.

FAIK J. OBAYDA.
Baghdad,
Iraq.

Plastic Bowls

SIR,—Would you be so kind as to put us in touch with a manufacturer of plastic bowls, 10 in. to 12 in. dia., 2 in. to 4 in. deep, also plastic mesh 10 in. to 12 in. dia.

WELLSON ENGINEERING CO.
Rufford Park,
Yeadon, Leeds.

New Productions

Resin Bonded Wood Veneer Tray

The range of fabrication techniques which can be employed with laminated wood veneers has been considerably increased by the use of synthetic resin adhesives. The tray illustrated here, manufactured by Borst Brothers, Ltd., Taylors Road, Stotfold, Beds., is a fine example of how double curvatures can be incorporated in a timber article. By combining wood veneers and urea-melamine resin adhesives and surface coating, a tray has been produced which combines the natural beauty of wood with the strength and durability of plastics. This forming technique has been utilized for a number of productions which include motor-car dashboards, cake-stands and trays.

Illuminated Coronation Sign

A coloured illuminated Coronation sign is fabricated from Perspex by Plastics (Manchester), Ltd., 11 Whitworth Street, Manchester 1. By using a 60-watt light source, and utilizing the edge-lighting properties of transparent Perspex in combination with a black background a very vivid effect has been created. The cross and fleur-de-lis motifs are in gold, with the jewels at the base of the crown in red, amber and blue. The symbol "E II R" is in red, the whole of the design being cut out on a black facia 18 in. x 12 in.

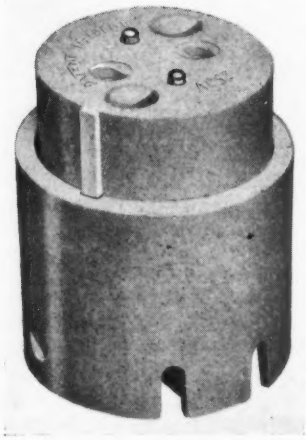
Container for Lighter Fuel under Pressure

A new smoker's lighter recently manufactured by the Rolstar Manufacturing Co., Ltd., Feltham, Middlesex, uses butane gas for fuel, which is contained in the lighter under pressure. Filling of the lighter is required only once in every few months. A container had to be found that would be transparent so that the amount of fuel should be visible. The container must also withstand any chemical action by the gas and a pressure of 30 lb. per sq. in., as well as being generally tough enough to stand up to the rigours of distribution. It also had to be right from the cost angle and manufactured to such accurate specifications that filling by the maker and use by the consumer were simple and trouble free.

The manufacturers approached J. F. Kenure, Ltd., of Feltham, Middlesex, who suggested a cellulose acetate moulding. A moulding powder was specially formulated by Courtaulds, Ltd., to meet these requirements. The mouldings were tested and found safe at a pressure of 100 lb./sq. in.

The container is filled at the base through small channels cut in the side of one end of a plug; when filling is complete, the plug is driven home, providing a strong seal.

In use, the sealed nozzle is screwed into the base of the lighter where it is pierced by a sprung needle valve.



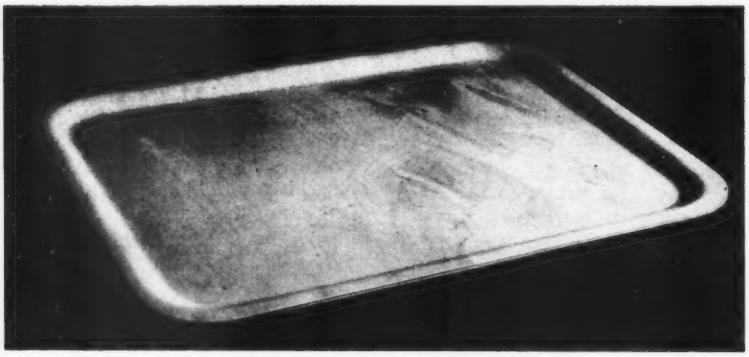
Bi-pin Holder for Fluorescent Tubes

A new retractable bi-pin lampholder for 1½-, 2-, 3- and 4-ft. fluorescent tubes has now been produced by The General Electric Co., Ltd. Having earth contacts, it is suitable for use with instant-start circuits and incorporates some novel features.

The tube is easily inserted into the holder by a direct push against the spring loading; no twisting of the tube is needed. Pill-type terminals, with side screws, are employed for ease of wiring. The cylindrical shape of the holder follows the line of the tube; the holder is made of white Beetle urea-formaldehyde powder. Its price is 4s. 4d.

Display Sign for British Railways

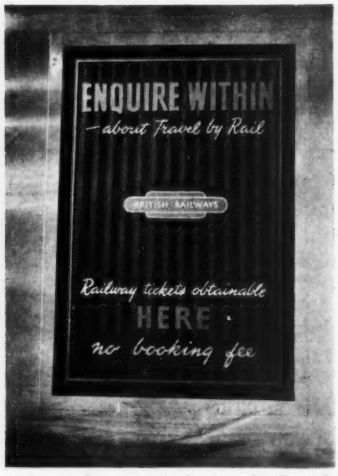
A new technique of producing signs with apparent depth has been developed by Retigraph Ltd., 22 Wardour Street, London, W.1, and is being used by British Railways for a window display for travel agencies and booking offices. The sign is produced in red, white and black on a transparent Perspex base and the effect of depth is obtained by a series of finely printed lines. The stand is formed from another piece of transparent Perspex bent to a suitable shape.



Wood veneer tray with double curvatures.

(Left) Illuminated Coronation sign.

(Above) Acetate lighter fuel container.

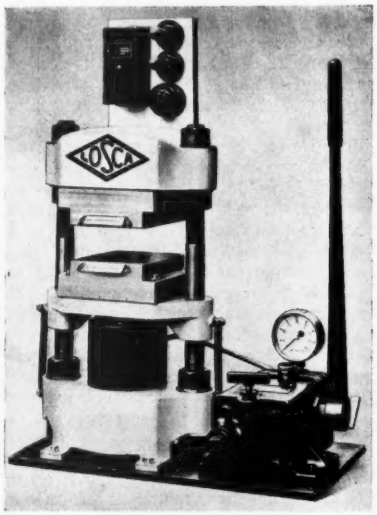


(Above) Perspex display sign for British Railways.

Plastics NEWS

Raw Materials, New Plant, Works Organization, Control Apparatus, Research, Personal and Trade Notes

NEW BENCH PRESS.—The London and Scandinavian Metallurgical Co., Ltd., of Gonsalva Road, London, S.W.8, have sent us some information on the new Losca 20-ton bench press which has been specially designed for moulding of acrylic teeth. Although manufactured for this particular purpose, it would seem that it can also be used for general small-moulding purposes. The press can be fitted up either for hot platen work or can be used as a cooling press. The hydraulic unit is manufactured by Tangye and the ram has a 4-in. run-out which makes it equally suitable for moulding small articles in thermo-plastics or thermo-setting materials.



Losca 20-ton bench press.

PRESS GUIDE TO BRITISH CHEMICALS.—Published by the Association of British Chemical Manufacturers, this book has been prepared to assist people who need a quick reference to sources of information relating to the chemicals industry. A valuable and handy reference work, the book comprises 76 pages and includes a glossary of proprietary and trade names, index of products, a list of chemical trade associations and a directory of Press contacts. Copies may be obtained free from the association, 166 Piccadilly, London, W.1.

CHEMICAL PLANT.—The 33rd annual general meeting of the British Chemical Plant Manufacturers Association was held at Grosvenor House, London, W.1, on April 15, and was followed by the Annual Dinner, at which the principal guest was Sir Harold Hartley, K.C.V.O. At the meeting the retiring Chairman, Mr. H. V. Yorke, of Bennett, Sons and Shears, Ltd., was re-elected.

Membership of the Association increased by 10, to 192, during 1952.

R. H. WINDSOR, LTD.—E. A. Norris, home sales manager of R. H. Windsor, Ltd., the manufacturers of machinery for the plastics industry, of Chessington, Surrey, who has been with the company for 14 years, has now retired from active work in this post. Mr. R. E. G. Windsor, managing director, has great pleasure in announcing that Mr. Norris will continue as technical sales consultant. Two farewell presentations to Mr. Norris were made at the company's works, one from the company and the other from executives and staff. Mr. R. E. G. Windsor's brother, Mr. G. T. Windsor, has taken over the position of home sales manager for the company's products.

PUBLICATION DATE.—The exhibition issue of Plastics *for June will be on sale in advance of normal publication date and will be available on June 8. The exhibition and convention opens on the same date.*

PLASTICS INDUSTRY GOLFING SOCIETY.—The annual Dinner and Dance was held at the Savoy Hotel on Friday, April 10, having been postponed from an earlier date due to the death of H.M. Queen Mary.

During the course of a most enjoyable evening Mr. Cyril Last, the President, delivered a short, but witty address. Dancing was accompanied by Sidney Lipton and his orchestra, and a cabaret and film show were presented.

WALLINGTON WESTON AND CO., LTD., announce that Mr. J. C. Houghton has been appointed Northern and Midland representative. Mr. Houghton, who has had 19 years' sales experience in the rubber and plastics industries, will have his business address at 8 Gordon Road, West Bridgford, Nottingham.

Mr. J. C. Houghton

RADIO COMPONENTS SHOW.—The Tenth Annual Exhibition of the Radio and Electrical Component Manufacturers Federation was held at Grosvenor House, Park Lane, London, W.1, last month. There are probably few industries which make so diverse a use of plastics or which are so advanced technically in employing the properties of the newer materials as the radio and electrical engineering industry. Nearly every one of the 118 stands showed the use of laminates, mouldings, extrusions and other synthetic resin products. One of the stands which aroused most interest was that of the Ministry of Supply where the effects of atomic energy radiation of high polymers was shown to the public for the first time (an account of this work, by Dr. A. Charlesby of the Atomic Energy Research Establishment, Harwell, is published on page 142 of this issue). Another exhibit on the Ministry of Supply stand showed the use of nylon gears and counter wheels for a high-speed counting mechanism.

Several companies who are well known in the plastics industry, were represented at the Exhibition. These included Bakelite Ltd., Thos. De La Rue and Co., Ltd., Micanite and Insulators Co., Ltd., who showed phenolic laminates and similar sheet insulating materials. British Moulded Plastics, Ltd., Cosmocord, Ltd., Telegraph Construction and Maintenance Co., Ltd., Thermo-Plastics, Ltd., showed plastics mouldings in phenolics, polythene, nylon and other plastics materials. The use of thermoplastics extrusions of p.v.c., polythene, nylon and p.t.f.e. was also seen on many stands, amongst producers of extrusions being British Moulded Plastics, Ltd., Thos. De La Rue and Co., Ltd., Durature and Wire Co., Ltd., Hellermann Ltd., Suflex Ltd., and Transradio Ltd. W. T. Henley's Telegraph Works Co., Ltd., showed a new product, i.e. wires with p.v.c. insulation with spiral colour identification bands incorporated in the insulating materials.

Polyester resins and similar cold-setting resins with good electrical properties have been used by a number of companies for embedding or bonding components such as capacitors, resisters and transformers. Parmeko Ltd., showed a particularly interesting range of transformers embedded in polyester resins.

IMPERIAL CHEMICAL INDUSTRIES, LTD. announce the appointment of Mr. F. Steadman to the Plastics Division Board.

HESS PRODUCTS, LTD.—We have heard that the fire which occurred recently at the Littleborough works of Hess Products, Ltd., the makers of Distec fractionally distilled fatty acids, has not caused as much damage as was feared, and, in fact, they are already once more in full production.

E. K. COLE, LTD.—It has been announced that Mr. M. K. Kaye, press officer of E. K. Cole, Ltd., is shortly to relinquish his post with Ekco to become Deputy General Manager of Turner's Lighter Spares and Components, Ltd. Although with the company for a relatively short time Mr. Kaye has made many friends both at Ekco and in the trade and this severance of association takes place with the utmost goodwill and regret on both sides.

PLASTADORS.—Plastador is the name which W. E. Bush, Ltd., of Hackney, has registered for a series of clear, sweet smelling preparations built up by a careful study of those odiferous substances which are found to be stable to the conditions under which plastics are processed and fabricated. It is of considerable advantage that plastic materials in general are free from odour at ordinary temperatures. This is particularly true of most thermoplastics. But at times the characteristic smell of phenols is sometimes apparent and requires to be masked. Polyvinyl chloride does develop a characteristic smell in warm conditions, and when used in thin sheet form with large surface areas, the odour can sometimes be objectionable. The introduction of Plastador perfumes completely masks these odours, and very small additions of a Plastador give extremely satisfactory results. In the manufacture of p.v.c. articles, the perfume can be added at any stage of processing, either by mixing direct with the polymer or with the granules or in the warming-up mill. In addition to masking odours present in the plastic materials, Plastadors may be used to introduce pleasant odours to the plastic products being produced.

Normally, as little as 2 oz. of Plastador per 100 lb. of stock will give adequate and lasting odour strength. The intensity of odour required will depend upon the end product. A wide range of odours are available, from delicate floral notes to medicated odours suitable for use in such products as domestic and hospital sheeting, protective clothing and similar products. Products having feminine appeal will benefit by the use of Plastadors imparting a definite floral fancy perfume, whilst the use of specially prepared Plastadors in connection with piping and utensils used in the food industry is a further obvious use. From experiments conducted with Plastadors, it has been found that they do not interfere in any way with the processes, and have no adverse effect upon colour or on the physical properties and durability of the finished products under normal conditions.

MOULDRITE FOUNDRY RESINS is the title of a leaflet issued by Imperial Chemical Industries, Ltd. Demonstrating the use of resins for core bonding, this leaflet forms part of an attractive new booklet covering I.C.I. moulding materials. Valuable information is given, flow characteristics, physical properties, and general moulding techniques for a growing application in the metal industry.

THE TELEGRAPH CONSTRUCTION AND MAINTENANCE CO., LTD.—Mr. C. L. G. Fairfield has joined the company as manager of the overseas division. After taking an honours degree in mathematics and mechanical sciences at Cambridge, Mr. Fairfield served an apprenticeship with Metropolitan-Vickers Electrical Co., Ltd. He was at one time secretary of the Mullard group of companies, a director of Mullard Equipment, Ltd., and a Mullard representative on the board of Telcon Telecommunications, Ltd.

Another appointment is that of Mr. W. Sampson to the position of commercial manager. Mr. Sampson was formerly with the Transmission Systems Division of Standard Telephones and Cables, Ltd.

BAKELITE, LTD.—In common with many other company reports issued in recent months, that of Bakelite, Ltd. reported difficulties in the year under review. Despite this, however, the total dividend for 1952 was maintained at 12½%, i.e., the same total amount distributed as for 1951.

The company has made an issue of £1,000,000 5% stock, 1968/77, at par.

BRITISH XYLONITE CO., LTD. The directors have declared a total dividend of 8% (same as last year). The 2% bonus has been omitted.

CATALIN, LTD.—The dividend for the financial year ending December 31, 1952, is 5%, the same as for 1951.

E. K. COLE, LTD.—At the extraordinary general meeting of the company, held on March 30, the resolution approving the capitalization of £42,010 15s. of reserves was duly passed. Renounceable allotment letters in respect of £168,043 new ordinary shares of 5s. each were posted on Wednesday, April 1, to ordinary stockholders.

ROSEDALE ASSOCIATED MANUFACTURERS, LTD., manufacturers of a large range of plastics toys and household articles will have a number of new items at their showroom, 11 Upper Grosvenor Street, London, W.1. They are inviting interested visitors from Great Britain and from abroad to inspect their products.

SELCOL PRODUCTS, LTD., manufacturers of toys and musical instruments, will have a private show at 114-116 Charing Cross Road, London, W.C.2. Among the items to be exhibited are a number of mouldings in polystyrene including an archer's bow, a sword, a miniature shaving set for boys, and a rocket-firing plane. On the musical side, mutes for brass instruments, injection-moulded from polystyrene, will be seen for the first time.

P. A. PERMUTA (PLASTICS), LTD., are having an exhibition of toys, household goods, fancy goods, industrial mouldings, etc., during the period of the British Industries Fair—April 27 to May 8. The exhibition will be staged in suites 306 and 417, at the Piccadilly Hotel, London, W.1.

BRITISH INDUSTRIAL PLASTICS, LTD.—The Annual General Meeting of the company was held on March 26 in London. Mr. Kenneth M. Chance, the chairman, presided.

In the course of his address he drew attention to the changed trading conditions, so sudden and severe that the Board deemed it desirable to advise shareholders of the position by issuing an interim report. The published report of the meeting included a graph which showed clearly the fall and subsequent recovery of sales in the Beetle moulding powders and in group turnover.

Mr. Chance outlined the economies that had been effected to offset so far as possible the severe fall in turnover. He also drew attention to the serious jolt experienced by the moulding factory at Streetly in common with other moulding shops which serve the electrical and other industries. He pointed out that it would be a wise and generous gesture on the part of those engaged in such industries if they would look into their stock position now, instead of waiting until it has reached bottom, and distribute some orders to those who keep them supplied with mouldings. It was very galling, when the recovery in demand for moulding powders came, to find every customer out of stock and clamouring for immediate delivery.

The Report and Accounts were adopted and a dividend of 12½% was approved.

UNPUBLISHED REPORTS.—Amongst the unpublished reports, which may be obtained from the Technical Information and Documents Unit of the Department of Scientific and Industrial Research at 15 Regent Street, London, S.W.1., the following titles have been announced: Triallyl Cyanurate Crosslinked Polyester Resins; Stress and Strain at Onset of Crazing of Polymethyl-Methacrylate at Various Temperatures; Chemistry of Copolymerization; Effects of Moderate Bi-Axial Stretch-Forming on Tensile and Crazing Properties of Acrylic Plastic Glazing.

INCORPORATED PLANT ENGINEERS.—Three technical meetings held by the Incorporated Plant Engineers may be of interest to people engaged in the plastics industry.

London: June 9, at 7 p.m. (preceded by tea at 6.30) at the Royal Society of Arts, John Adam Street, Adelphi, Strand—"Thermal Insulation of Plant and Buildings": C. G. Bower, of Newalls' Insulation Co., Ltd.

Newcastle-on-Tyne: June 11, at 7.30 p.m., at Roadway House, Oxford Street—"The Plant Engineers and the Factories Act": A. Hewitt, H.M. Inspector of Factories.

Herts Discussion Group: June 16, at 7.30 p.m., at the Peahen Hotel, St. Albans—"Dust Extraction."

Photograph taken in the research laboratories of Bakelite Ltd. during the recording of the recent broadcast, "Discovery — A Plastic World?" The photograph shows Mr. Prestridge of the B.B.C. and Dr. Hunter, manager of research at Bakelite Ltd., rounding off the broadcast.

AGENCY INQUIRY FOR PLASTIC FLOORING.—The United Kingdom Trade Commissioner in Wellington has reported that P. M. Taylor and Co., P.O. Box 2131, Wellington, wish to secure the representation of United Kingdom manufacturers of p.v.c. or similar type plastic flooring, in either sheet or tile form. The Wellington firm, who require types of flooring suitable for use in both commercial and domestic buildings, emphasize the necessity of a good range of colours to meet New Zealand market requirements. Interested firms are invited to communicate direct with the Wellington firm, giving full particulars of the goods they have to offer. Firms taking action in connection with this inquiry are particularly asked to kindly advise the department that they are doing so, quoting reference CRE/8565/53. All inquiries by telephone should be made to Trafalgar 8855, Ext. 2928.

PURCHASING SERVICE. — In the course of business as distributors for a large number of Continental and Overseas manufacturers, R. H. Cole and Co., Ltd., receive inquiries for many items outside their normal range of products. As part of their service to the industry, they have now extended their Purchasing Department for the specific purpose of meeting out-of-the-ordinary requirements in the way of raw materials and intermediates. They invite inquiries, and their experience and wide knowledge of the chemical industry will be applied to obtaining anything from regular bulk supplies to a laboratory sample.

TAR ACIDS REFINERY.—Monsanto Chemicals, Ltd., and The Midland Tar Distillers, Ltd., jointly announce that due to good progress with the building of a tar acids refinery at Four Ashes, near Wolverhampton, The Midland Tar Distillers will take over from Monsanto the selling and sales service of:—

(a) Ortho-cresol and all grades of Cresylic Acid as from April 1, 1953.

(b) Natural Phenol on July 1, 1953.

It will be recalled that in October, 1951, it was announced by the two companies that The Midland Tar Distillers, Ltd., was building the refinery

DUNLOP, LTD.—Mr. N. G. Bassett Smith, sales manager, compositions and flexible plastics division of Dunlop Special Products, Ltd., Fort Dunlop, has been elected to the executive council of the Institute of British Carriage and Automobile Manufacturers.

U.S. INQUIRY FOR P.V.C.—The British Consulate-General at Chicago has reported that the Transilwrap Co., 2814 West Fullerton Avenue, Chicago, is interested in importing polyvinyl chloride and cellulose acetate from the United Kingdom. United Kingdom firms interested in this inquiry should communicate direct by air mail with Mr. D. Minkus at the address above, sending:—(1) Quotations in U.S. dollars c.i.f. Chicago. (2) Indication of earliest delivery dates. (3) Samples, if available. In order to avoid the possibility of damage in transit it is essential to ensure that any samples sent by post to the U.S.A. are carefully packed. To enable the Overseas Officer to pursue this inquiry and to assist in approaching other potential importers, it would be appreciated if responding firms would send copies of their offers to the British Consulate-General, 39 South LaSalle Street, Chicago 3, Illinois. It would also be useful if the Department could be informed of action taken. Inquiries by telephone about this notice should be made to Trafalgar 8855, Ext. 2933.

ACHESON ENTERS COLOURING.—With more than 40 years' experience of dispersing solids in liquids and other media, Acheson Colloids, Ltd., has commenced the production of carbon-black dispersions and other colour concentrates in its newly created Colour Division at Slough, Bucks. Colours of all kinds are being dispersed in plasticizers, water and various other media, for leathercloth manufacturers, ink and lacquer makers. Their specialized experience in the manufacture of colloidal dispersions of graphite, now used on a world-wide scale, has been turned to the manufacture of high-grade pigmented pastes. The Colour Division factory is situated at Buckingham Avenue, Slough, Bucks (telephone 22084), with head office at 18 Pall Mall, London, S.W.1 (telephone, Whitehall 2034). Acheson Colloids, Ltd., is a unit of Acheson Industries Inc., of New York, which controls Acheson Colloids Co., of Michigan, U.S.A., and the well-known Peerless Printing Ink Co. of Philadelphia. The British end of the Acheson Organization established its main works at Plymouth in 1910, which has continued to expand over the years and now enjoys an international reputation for fine-quality graphite dispersions

NEW BRITISH STANDARD.—"Thermosetting Synthetic-resin Bonded-paper Round Tubes for Use at Radio Frequencies (B.S. 1951 : 1953)" is the title of a new standard dealing with synthetic-resin-bonded paper materials for use as electrical insulation. It specifies the requirements of two grades of circular cross-sectioned tubes for use at radio frequencies and in this respect is complementary to B.S.1314 (1946) and to B.S.1885 (1952) which cover, respectively, circular and rectangular cross-sectioned synthetic resin-bonded paper tubes for electrical power circuits. Requirements for tubes up to 1-in. external diameter are specified and the electrical and physical properties covered include power factor and permittivity; insulation resistance along laminæ; density; water absorption; cohesive strength between lavers, and dimensional tolerances. Methods of test to check compliance with the specified requirements are fully described in appendices. Copies of this standard may be obtained from the British Standards Institution, Sales Branch, 24 Victoria Street, London, S.W.1. Price 2s. 6d.

TRAINING GRANTS, 1953.—The Trustees of the Plastics Industry Education Fund invite applications from young men or women engaged in the plastics industry, for a limited number of training grants of £100 per annum for one year to cover all expenses, including tuition fees, which may be increased at the discretion of the committee in special cases, the onus being upon the candidate to find a suitable college willing to admit him or her. These grants are for full-time courses of one year's duration, for technical training covering Associateship of the Plastics Institute, Inter. Special or intensive Final B.Sc. Courses in Pure and Applied Mathematics, Physics and Chemistry, or an intensive course for a Diploma or National Certificate in Chemistry, Electrical or Mechanical Engineering. Deferment from National Service may be granted by the Ministry of Labour and National Service for five years to students registered at the Institute offices, who intend to take the Associateship courses, or full degree courses provided that the student can complete courses prior to his or her 26th birthday. The Trustees hope that these grants may help young men and women in industry to obtain higher education leading to further university degree courses. Candidates are required to submit a recommendation from their employers, together with documentary evidence of scholastic or academical qualifications, e.g. (School Certificate, General Certificate of Education, Matriculation, National Certificate), etc. Applications for training grants must be submitted in writing to the Managing Secretary, The Plastics Institute, The Adelphi, Adam Street, London, W.C.2, by June 1, 1953.

Book Review

"Fundamental Principles of Polymerization." By G. F. D'Alelio. John Wiley and Sons, Inc., U.S.A. Available from Chapman and Hall, 37 Essex Street, W.C.2. Price 80s.

Dr. D'Alelio is to be congratulated on writing yet another volume which fills a void in the range of books that already exist on plastics. His "Experimental Plastics and Synthetic Resins" is already well known to those in the industry.

"The Fundamental Principles of Polymerization" will prove of great value to the research chemist and to the student of high polymers. Most workers in the application field will also find it of interest and assist them in the interpretation of their results.

Nearly all of the physical chemistry of polymerization processes and of the resulting polymers are adequately described. Two chapters on difficult subjects which are not only concise but are easy to read, are those entitled "Kinetics of polymerizations" and "Reaction Loci in polymerization systems."

The chapter dealing with the thermal degradation of polymers is not quite up to date as there is no reference to the organo tin compounds and their functionality as stabilizers for vinyl systems. The reason for this could, of course, be due to the fact that our knowledge on the physico-chemistry of the stabilization of vinyl systems is very recent.

The subject and author indices are comprehensive, as are, in the main, the list of references at the end of each chapter, although it must be admitted that the number of non-American references quoted is small.

Techniques of Moulding Polytrifluorochloroethylene

By CARMEN R. GIANNOTTA*

This paper published here by the courtesy of the Society of Plastics Engineers Incorporated, Athens, Ohio, is reproduced from the "S.P.E. Journal," February, 1953. KEL-F is one of the materials referred to in the Productivity Team Report on plastics moulding, published recently by the British Productivity Council ("Plastics," March, 1953).

Introduction

CONSIDERABLE technical information has been published regarding the chemistry and the physical properties of polytrifluorochloroethylene. Therefore this paper will deal primarily with the conditions of its use as a thermoplastic resin in the injection and compression moulding industry. However, it would probably be well to review briefly some of the forms in which this polymer exists and a few of its major physical properties.

Polytrifluorochloroethylene is polymerized from purified monomeric trifluorochloroethylene in the presence of a peroxide catalyst under carefully controlled temperature and pressure conditions.

The polymer exists in various forms from a low molecular weight light oil to a high molecular weight solid plastic material, as shown in Fig. 1. As we are mainly concerned with the moulding powder forms, we will only consider the higher molecular weight compounds. This polymer is currently produced by the M. W. Kellogg Company in Jersey City, New Jersey, and sold by them under the trade mark KEL-F. We refer particularly to Kellogg's KEL-F brand moulding powder grade 300, etc.

As polytrifluorochloroethylene is a "lot of word" to keep repeating, and since our work has been exclusively with our own KEL-F brand product, we shall hereafter refer only to KEL-F.

Both grades of KEL-F are produced as low-density moulding powder (approximately 19 lb. per cu. ft.) and high-density moulding powder (approximately 60 lb. per cu. ft.). These grades of polymers can also be plasticized with lower molecular weight oils and waxes.

The high-density powder is composed of granules approximately $\frac{1}{8}$ in. diameter and $\frac{1}{8}$ in. long. The low-density moulding powder consists of a much finer powder, approximate 20-30 mesh. In its natural state at ambient temperature, the powder has a milky white colour and as it is gradually heated to its plasticizing temperature, the colour changes from a milky white to a clear transparency as it reaches the transition temperature of 415° F. (213° C.). This change of colour indicates that the structure of the material has changed from a partially crystalline form to an amorphous form. These two forms are shown in Fig 2. If the material above the transition temperature of 415° F. (213° C.) is cooled slowly to ambient temperature, it will again regain somewhat the milky white appearance. However, if it is quenched rapidly through the transition temperature of 415° F. (213° C.), the molecular chains remain in a random state and the material will retain its transparent appearance, indicating an amorphous state.

Constant mention will be made to the grades 300 and 270 moulding compounds, therefore we should know what these numbers mean. As the behaviour of the various grades of polymer are related to the molecular weight, a method of determining this value is required to control the manufacture of the polymer and finished fabricated item. Since the actual molecular weight of a polymer is difficult to determine and since the molecular weight is related to the viscosity of a polymer, a viscosity measurement can be used for control of the polymer and fabricating process. There are several methods of determining viscosity of a plastics material, the one used by the M. W. Kellogg Company for KEL-F being a solution viscosity method. This test is described in a report by the M. W. Kellogg Company and consists of putting a very small quantity of moulding powder or polymer in an aromatic hydrocarbon solvent at an elevated temperature and measuring the viscosity of the solution. However, this method of measurement of viscosity is not practical for use by a polymer production unit or a moulder of KEL-F. Therefore, a method called the No Strength Temperature test, or NST, was developed and is directly related to solution viscosity.

TABLE I
TABLE OF GENERAL PROPERTIES

Specific Gravity	2.1
Thermal Conductivity gr. cals/sec./cm²/°F./cm	1.44x10-⁴
Specific heat-granular form	0.216
Water absorption	0.00%
Water vapour transmission 3.8 mils sheets gr/100 sq. in./24 hrs. at 100 degrees F. and 95% R. H. differ.	0
Chemical resistance—all acids, alkalies, fluorine, fluorides	V. Good
Index of refraction	1.43
Non-inflammable	

This test consists of determining the temperature at which a standard sample will fail under essentially no load. To perform the test, a sample of the polymer or fabricated part is pressed into a $\frac{1}{16}$-in. thick disc. A strip $1\frac{5}{8}$ in. long by $\frac{1}{8}$ in. wide is then cut from this disc with a double notch cut 1 in. from the end of the strip in order to give a cross-section of $\frac{1}{16}$ in. x 3/64 in. at the notch. A weight is then attached to the 1-in. end to give a total weight of plastic and added weight from the notch down of .5 grams (see Fig. 2).

The sample is then suspended in a heated atmosphere provided by means of a special apparatus and the temperature raised $1\frac{1}{2}$° C. per minute until the sample breaks at the notch. The temperature of the oven is then read as the No Strength Temperature or NST value. A difference of plus or minus 5° C. is normally considered significant when comparing different sets of test apparatus.

The grade numbers of the moulding powder are then classified as grade 300, being nominally 310° C. NST and grade 270, being nominally 270° C. NST.

Table I shows some of the general physical properties of this material. Its resistance to inorganic solutions and compounds is excellent. It is equally resistant to most organic solvents and compounds but is slightly swelled and plasticized by some highly halogenated materials and aromatics. This will generally be of a minor nature. It has zero moisture absorption, extremely low moisture vapour transmission rate and resists wetting by water. It has an excellent anti-sticking surface and therefore no known cement is available for KEL-F. It has good electrical properties over a range of high and low frequency. It has a high tensile and impact strength over a wide range of temperature. It is also transparent to light rays in the near infra-red region.

* M. W. Kellogg Company.

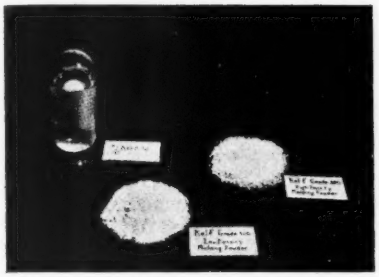


Fig. 1. — Samples of KEL-F polymers, manufactured by the Kellogg company.

At this point we might look at several moulding applications showing where the various physical properties, such as chemical inertness and chemical resistance, combined with mechanical strength, are required. Figs. 3, 4, 5, 6 and 7 illustrate some typical applications.

Further reference will be made to these parts in a latter part of this paper, giving data concerning their fabrication.

The first consideration given in the moulding of KEL-F is cleanliness. This material is packaged in polyethylene-lined drums up to a maximum of approximately 250 lb. capacity. Before the metal cover is placed on the drum, a polyethylene sheet is laid over the top of the material. This is to prevent any particles from flaking off the metal cover and dropping into the moulding powder. When the drum is received at the moulder's plant it should be stored in a clean, dry location. Before the drum is opened, it should be wiped with a clean rag and care should be taken, when the cover has been taken off, that dirt and dust from the outside does not fall into the moulding powder. After the drum has been opened, the material should be removed from the drum to the hopper scale or mould by means of a metal scoop or plastic container, which has been thoroughly cleaned. After the required amount of material has been removed from the drum, the cover should be put back on top of the drum immediately to prevent any foreign material from contaminating the moulding powder.

The same cleanliness that applies in the handling of the containers applies to the press and the working conditions around the press. When a machine has been used for other materials or has been idle for several days, it should be thoroughly cleaned. In fact, it is highly desirable to wipe off

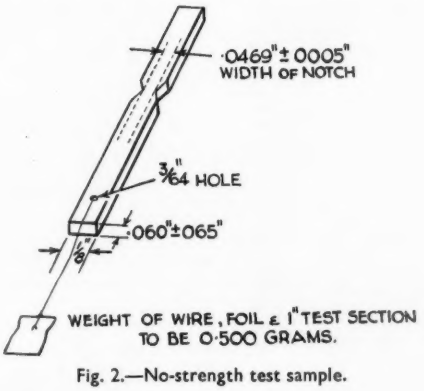


Fig. 2.—No-strength test sample.

any surface that comes in contact with the moulding powder with a solvent, such as acetone or carbon tetrachloride. On an injection moulding press, it is generally easier to remove a cylinder and thoroughly clean it, rather than flush other materials out of the cylinder. This is due to the fact that KEL-F is a high-temperature material and, at the temperature required to plasticize this material, other moulding compounds will char and burn. After cleaning the cylinder, it should then be washed with carbon tetrachloride, or acetone, to remove any film of grease or other organic material.

You may wonder why all this care and cleanliness is necessary in the handling of KEL-F moulding powder. The reason is that, at the high temperatures necessary for moulding KEL-F, any foreign matter of an organic nature deposited on or in the KEL-F is decomposed, producing brown stains, streaks or dirt marks in the moulded parts.

Injection Moulding

As this KEL-F polymer is a true thermoplastic, it can be moulded in almost any injection press of current manufacture. However, there are several minor changes that are recommended to produce a more efficient operation. Some of these changes are important for other materials but they are more important for KEL-F because of the higher plasticizing temperature and the narrower ranges between plasticization and degradation.

In discussing desired changes and modifications to present moulding presses, one of the first items is the instruments used to control the injection cylinder and nozzle temperature. The proportioning type of temperature controller, that has been adequately checked for accuracy is a practical necessity. The indicated temperatures should not vary more than plus or minus 5 degrees during the injection moulding process. The nozzle should be separately heated and controlled with the heat source as close to the end of the nozzle as possible. Most commercial machines presently on the market have a maximum injection pressure of 20,000 p.s.i. As KEL-F, at its plasticizing temperature, has a high viscosity, injection pressures as high as possible are desirable, such as up to 40,000 p.s.i. The thermal conductivity of this polymer is very low. Therefore a cylinder designed to heat the material in the thinnest practical layer is desirable. Also, good contact between the torpedo and cylinder or an internally heated torpedo, in order to heat the material from both sides, is helpful.

The nozzle should have a reverse taper at the tip so that when the sprue is pulled, a small section of KEL-F is removed with the sprue, which will tend to eliminate "cold slugs." It is also preferred that the nozzle be separately heated so as to maintain the nozzle at a temperature above the average temperature of the polymer in the cylinder. Both the nozzle and the cylinder assembly should be designed so that there are no undercuts or pockets for material to hang up and degrade.

Since the rate of degradation of this polymer is a time-temperature function, control of the moulding cycle is a most important function. The most important time is that of the overall cycle. This timer should measure and control the close-to-close cycle of the mould. This overall cycle timer takes the human element variation out of the moulding operation and therefore a change of cycle is not required when a shift or personnel change is made. It is known that a variation in cycle will vary the temperature of the material in the injection cylinder and, as we stated previously, we want the material temperature to be held to the smallest possible variation.

In the injection moulding process for all thermoplastic materials, as the plasticized material leaves the nozzle and enters the sprue bushing, it starts to cool to a solid state. As it moves from the sprue bushing through the runners and gates and thence into the cavity, it continues to get colder. During the flow of plastic through the sprue, runner and gates, the material next to the metal surface of the mould will solidify first and provide insulation for the centre core through which the plastic continues to flow. This produces a skinning effect, that is, the centre of the plastic will remain semi-fluid and keep moving under the injection moulding pressure, while the outside layer remains fixed. The higher the viscosity of a plastic at its plasticizing temperature, the higher the mould

temperature required to allow the flow of plastic from the nozzle to the cavity. A higher mould temperature would tend to reduce the thickness of this skin or eliminate it entirely on heavy cross-sections.

In general, design of injection moulds for KEL-F parts are similar to mould designs for other materials. Sprues, runners and gates should be as large as possible commensurate with the design of the particular part that will be moulded. This is to provide as large as possible cross-sectional area for the material to flow. They should also be as short as possible, that is, the sprues as short as possible, the runner as short as possible and the gate as short as possible. All corners should have generous radii applied to them. The object of these design factors being to move the material into the cavity as fast as possible. Injection moulds should be provided with methods of heating to a temperature of 300-350° F. The practical temperature will be as hot as possible, within this range, and still be able to remove parts from the mould. If the mould is electrically heated, suitable controllers should be provided. In the case of heating with steam or a liquid medium, suitable gauges are provided. If a two-plate mould is used, then two zones of heat should be provided and, if a three-plate mould is used, three zones of heat should be provided. All metal surfaces which come in contact with the material should be chrome plated or made from a high-grade stainless steel. This includes the sprue bushing, runner, gates and the cavities themselves. In addition, it is generally good practice to insulate the mould base from the press platens with a material such as transite or asbestos.

In nearly all injection moulding processes a sprue and runner will be obtained for each " shot " of the moulding press. With most thermoplastic material, the sprue and runner can be re-used either " as is " at the press or by regranulating and mixing with virgin material. KEL-F can be handled in the same way except that care must be taken to avoid contamination and degraded materials. It is generally advisable to re-use the KEL-F sprue and runner individually and not allow them to accumulate, for it is difficult to keep them dirt-free.

We have mentioned degradation of KEL-F polymer. Briefly, degradation, accomplished both thermally and mechanically, is a reduction in the length of the polymer chain and hence a reduction of molecular weight and viscosity. This, of course, results in lowered NST value and lowers the resistance of the polymer to high-temperature uses.

Compression Moulding

Any part that is possible to mould can be compression moulded using KEL-F. The simplest of these parts, such as flat sheets, gaskets and " O " rings, can be moulded by using positive-type moulds, or, in the case of flat sheets and gaskets, between thin metal plates or aluminium foil with stops to give the correct thickness. These type parts can be moulded using either a high- or low-density moulding powder and can be preformed to a desired shape, using preform equipment.

Again, it might be well to mention that cleanliness is very important in the fabrication of good parts. Preform machines and dies should be thoroughly cleaned prior to use and not be operated adjacent to preform machines used on other compression type of materials. The powder should be weighed on clean scales and containers used in transferring materials should be glass, plastic or metal, but in no case should cardboard, wooden or paper containers be used.

In the manufacture of thin flat sheets, powder, either high or low density, preformed or bulk, is placed between thin metal plates between heated platens of a press, the platens being controlled at the temperature of 520° F. In no case should the temperature rise above 550° F. or degradation will occur very rapidly. The temperature should be maintained until the polymer is plasticized and the exact temperature of moulding will depend upon the NST of the polymer. Much below 480° F., plasticizing will not take place and the part will have little or no strength. The time required to heat and cool sheet material will vary somewhat with different equipment in different moulders' plants. As an example, a disc $\frac{1}{16}$ in. thick by 4 in. in diameter will take approximately 3 minutes to bring up to temperature and about 2 to 3 minutes to cool. However, by quenching this in cold water, it can be removed from between the plates almost immediately. If a mould is used to manufacture flat sheets, cooling of the mould should be effected under pressure, preferably at a pressure about the initial compacting pressure.

A disc $\frac{1}{4}$ in. thick and approximately 30 in. in diameter will take approximately 1 hr. to heat and approximately $\frac{1}{2}$ hr. to cool between cold press platens. Other plastic parts, such as chemical laboratory ware (beakers, funnels, etc.), pump bodies, valve diaphragms, valve seats and other parts, that are too heavy in cross-section to be economically moulded by conventional injection equipment, can be compression moulded using flash- or landed-type moulds. Heating and cooling cycles will again depend on the individual moulder's equipment. However, cycles at the temperature of 500° F. will range from 2 to 5 minutes for a $\frac{1}{16}$-in. thick by 4-in. valve diaphragm, weighing approximately 30 to 60 grams, to $1\frac{1}{2}$ to 2 hr. for a $1\frac{1}{2}$-in. by 6-in. insulator weighing $1\frac{1}{2}$-2 lb. These cycles are based on heating and cooling the article in the mould and preheating of preforms or powder will help cut cycles and is highly recommended for providing a thorough heating of the material.

A variation of straight compression moulding is the technique of using a relatively thin, high heat-conducting material, such as brass or aluminium, for fabricating of the cavity and then heating the cavity and moulding powder to temperatures in an oven or other suitable piece of equipment. The cavity and plasticized powder is then transferred to a chase, then can be cooled. Transfer of plunger moulding can also be used, keeping the pot and transfer ram at the plasticizing temperature and only heating and cooling the force and cavity.

Compression and transfer moulds should be made from a high-grade stainless steel or chrome-plated steel or, possibly, chrome-plated beryllium copper.

Referring again to the photographs, we can discuss some of the actual moulding conditions that were used in the manufacture of these parts.

Fig. 4 (above).—Electrical insulator moulded by Fluoro Plastics Inc.

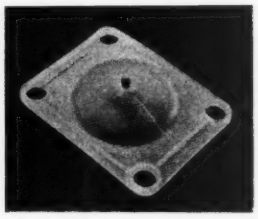
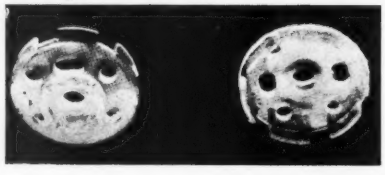


Fig. 3 (above).—Valve diaphragm moulded by Molding Corporation of America.

Fig. 5 (below).—Relay spider moulded by General Electric Company.



The insulator, weighing approximately 1½ lb., shown in Fig. 4 was moulded by Fluoro Plastics, Inc., of Philadelphia, Pennsylvania, in a single-cavity compression mould. The overall cycle was approximately 1 hr., which included 40 minutes to heat the material, 20 minutes to cool. The mould temperature was adjusted to 520° F. This moulding arrangement was experimental and it is believed that the cycle could be cut approximately in half on a production basis.

Fig. 3 shows a valve diaphragm, weighing approximately ¼ lb. and 4 in. x 5 in. x ⅛ in. thick, moulded by Molding Corporation of America, Providence, Rhode Island, using plasticized KEL-F in a fully positive compression mould. A temperature of 480-500° F. and an overall cycle of approximately 15 minutes were used. This included 7 minutes to bring the die to temperature, 5 minutes to allow the material to heat and 3 minutes for cooling.

TABLE II

PART TOLERANCES

Nominal Thickness Inches	Tolerance Inches
0.00 – 0.500	plus or minus .005
0.500 – 1.00	plus or minus .010
1.00 – 2.00	plus or minus .020

MOULD SHRINKAGE

Nominal Thickness Inches	Shrinkage Inches/inch
0.00 – 0.250	.005 – .007
0.250 – 0.500	.005 – .010
0.500 – 1.00	.010 – .015

Fig. 5 is a relay " spider " weighing 2 grams, moulded by the General Electric Company in Taunton, Massachusetts, using a 2-oz. Reed-Prentice and a pressure of 34,000 p.s.i. The cylinder temperature was 525° F., the nozzle at 560° F. and an overall cycle of 38 seconds was used. One interesting point is that these parts were moulded in a die made for nylon with a gate diameter of .030 in.

The drum plugs shown in Fig. 6 were injection moulded by the American Flange Co. in Linden, New Jersey, in a 2-oz. Watson-Stillman press, using 20,000 p.s.i. For the small plug, weighing 11 grams, the cylinder temperature was set at 520° F. and an overall cycle of 69 seconds used. For the large plug, weighing 51 grams, the cylinder was set at 500° F. and an overall cycle of 2 minutes 51 seconds used. Shorter cycles were attempted; however, the KEL-F could not be fully plasticized in less time with this size press.

Fig. 6. — Drum plugs, moulded by American Flange Co., for drums containing fuming nitric acid.

Fig. 7 shows an electronic tuner moulded by Fluoro Pastics, Inc., in Philadelphia, Pennsylvania, and it is believed to be the largest moulded piece of KEL-F, weighing approximately 5½ lb. This was compression moulded and the overall cycle was approximately 3 hr. This allowed approximately 2 hr. to bring to temperature and 1 hr. to cool. The mould temperature was adjusted to 510° F.

On these applications, in general the time cycle of moulding will also depend on the NST of the polymer, in addition to mould design and size of the part.

Table II shows the part tolerances and mould shrinkage that can be expected in the design and moulding of KEL-F parts.

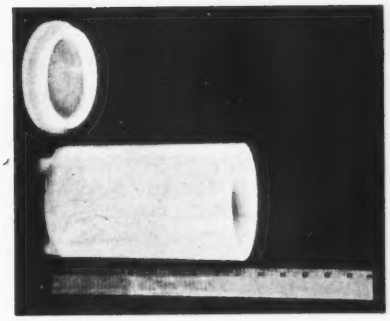


Fig. 7.—Electronic tuner moulded by Fluoro Plastics, Incorporated.

These values can be varied by an individual moulder's processing techniques, therefore some deviation from these values can be expected.

In conclusion, it might be well to review a few of the major points necessary for successful moulding of KEL-F.

General

1. Cleanliness of material, machine and working conditions are essential to prevent the introduction of contaminating elements.
2. Cycles should be uniform and well controlled.
3. Stainless or chrome-plated steel should be used on any metal surface in contact with the material.

Injection moulding

1. The injection cylinder design should provide thin cross-sections of flowing KEL-F for better conductivity and to avoid material degradation.
2. Die temperature should be as high as possible, 300-350° F., commensurate with ability to remove parts from the mould.
3. Temperature controllers should be of the proportioning type and adequately checked for accuracy.
4. Sprues and runner should be kept free of grease and all other contaminants and re-used immediately.
5. Machine feed should be accurate and uniform.
6. Injection pressures to 40,000 p.s.i. are desirable.

Compression Moulding

1. Moulds should be heated to a temperature of 500° F. and cooled under pressure.
2. Material should be thoroughly plasticized before cooling.
3. Deep-draw models should be vented to prevent air entrapment.
4. Part should be quick quenched for greater clarity.

With these points accomplished, any moulder should be able to mould parts using KEL-F successfully.

Photo-electric Engraving

In recent months we reported the development of a new aid for the blind, making use of various new techniques including scanning by means of photo-electric cells. The *Financial Times* scientific correspondent recently pointed out that a further development of this use of the photo-electric cells in a new process for the automatic control of an engraving tool.

A photo-electic cell methodically scans the original from which the engraving must be reproduced. At the same time, the engraving tool is carried over the virgin block cutting deeply or finely, or not cutting at all, as " instructed " by the scanner. It is claimed that this recently patented process has many other applications than the reproduction of printing blocks for which it was specifically designed.

The production of certain types of plastic moulds or of fine surface markings on metal products could be automatically controlled in a similar way.

British Plastics Convention, 1953

The Second British Plastics Convention is to be held at Olympia during the period of the British Plastics Exhibition, June 8 to 18. The Convention will consist mainly of papers of interest to the plastics technologist but will include others to interest a wider audience. All sessions will be held in the Convention Hall of the National Hall, Olympia. Admission is open to all. We publish here, a programme and summaries of some of the papers to be read at the Convention. Summaries of the remaining papers will be published in the June issue of "Plastics."

INAUGURAL ADDRESS

MONDAY, JUNE 8, 4 P.M.

The Right Hon. the Earl of Halsbury, F.R.I.C., F.Inst.P., managing director, the National Research Development Corporation.

UNPLASTICIZED P.V.C.

TUESDAY, JUNE 9, 10.15 A.M.

Problems Related to the Manipulation of Unplasticized Polyvinyl Chloride. By J. J. P. Staudinger, Dr.Ing., Director, British Resin Products, Ltd.

Fabrication of unplasticized p.v.c. involves deformation of the material under heat. Two properties of the polymer are fundamental to this process, namely the flow properties and the resistance to thermal degradation. Normally the flow properties in non-chlorinated vinyl polymers can be brought to the required level by raising the temperature, but in the case of chlorinated vinyl polymers their tendency to decompose or degrade at elevated temperatures imposes an upper limit, on working temperatures. The present practice of adding stabilizers to raise the heat resistance, and of adding lubricants and/or plasticizers to improve the flow characteristics of the polymer, is but an expedient though practical way to overcome these deficiencies of the polymer.

The number of materials claimed to function as stabilizers is very great, but only few have found commercial acceptance, such as the salts of lead, cadmium, tin, calcium. It now appears certain that stabilization involves several reactions of different nature, the most important of which is the fixation of hydrochloric acid. The use of oxidizing agents, reducing agents, free radical generators, chelates, hydrazides and others disclosed as stabilizers for p.v.c. in the patent literature is perhaps a pointer to mechanisms other than the reaction with hydrochloric acid. Equally complex is the action of lubricants or flow promoters in the hot plastics material, involving perhaps the reduction of forces between molecules. In addition to internal friction, a reduction of friction between the fused mass and the machine elements with which the mass is in contact is also required. All this would indicate that incompatibility is an essential feature of the lubricant.

Notwithstanding practical success of these now generally accepted practices, the possibility should not be overlooked that, by structural changes of the polymer itself, improvements in the rate and efficiency of flow and greater resistance to thermal decomposition may be achieved. From this point of view the effects of co-polymerization, chainlength, molecular weight distribution and of structural variations in the polymer molecule are examined.

At the same time the likely causes for the thermal decomposition (hydrochloric acid and/or chlorine cleavage) are examined, such as the effect of extraneous impurities, of oxygen and of polymer configuration.

Conjecture and evidence point to the likelihood of producing a vinyl chloride polymer which flows readily over a not too narrow temperature range, possesses a satisfactory softening point and has improved decomposition resistance at the temperature of working.

Industrial Applications for Unplasticized P.V.C. By J. S. Byers, Technical Service and Development Department, Imperial Chemical Industries, Ltd. (Plastics Division).

Early difficulties associated with the heat stability of unplasticized p.v.c. at the temperatures necessary to convert the polymer, without the aid of plasticizers, to the forms in which industry could use it are still with us in part, but considerable progress has been made of recent years and unplasticized p.v.c. in the form of mouldings, extrusions, foils and sheets are now available. The original applications were almost exclusively in the field of chemical plant construction because of its excellent resistance to chemicals and the high impact strength of the product. The scope of unplasticized p.v.c. has been broadened during the past few years and products based on moulding, extruding, calendering and laminating are being developed in many industries.

The long-playing gramophone record is an outstanding application in the field of moulding, but apart from this it is in the form of sheet where we can expect the most rapid progress in this country. It is fortunate that fabrication techniques and equipment for rigid p.v.c. sheet follow very closely those so well established for acrylic sheet.

Recent applications which are showing particular promise include reflectors for fluorescent lighting fittings, linings for refrigerators, safety helmets, equipment for the manufacture and handling of foodstuffs and pharmaceutical products, signs and displays.

PLASTICS MATERIAL DEVELOPMENTS

TUESDAY, JUNE 9, 2.30 P.M.

Recent Commercial Development of Melamine and Guanamine Resins. By F. J. Mills, M.Sc., Ph.D., Technical Sales Manager, Chemicals Division, The British Oxygen Co., Ltd.

At the present time a number of moulders are offering melamine mouldings to the electrical, hardware and light-engineering trades. The "Boil Test," when intelligently applied, will no doubt result in the virtual elimination of faulty melamine mouldings.

The paint industry's production and intake of hydrocarbon-soluble melamine resins is increasing steadily. Development in this trade tends towards uses for the higher ethers of hexa-methylol melamine, emulsions of internally plasticized melamine resins and combinations of nitro-cellulose, styrenated alkyds and melamine resins.

Textile applications for melamine resins are well distributed with emphasis on obtaining a measure of dimensional stability with rayon fabrics. Other textile applications for melamine-type resins may include crease-resistant finishes for cotton and rayon. Wool finishers are now examining the chlorinated methylol melamines as a means of obtaining "non-shrink" and non-felting properties.

Paper is given "high wet-strength" by addition of colloidal melamine formaldehyde complex at the beater stages, but its use is restricted to bleached stock. Paper converters are showing interest in melamine formaldehyde condensates for modifying starch-based glazes with the intent of increasing mar resistance and water resistance. Combinations of methylol melamine and gelatin or casein are also being examined as glazes for paper, boards and leather.

Leather tanning with methylol melamines is known to produce a full, soft white leather that does not yellow and has a high shrinkage temperature. The future bulk market for melamine in this trade will possibly be as a pre-tan for heavy hides and industrial leathers followed by a chrome tan.

Decorative laminates continue to be a small but important market for melamine. The applications for melamine resins in this market is as a surfacer where translucent laminates are required.

Glasscloth melamine laminates are discussed. Key coats applied to the glass cloth are major components of any such laminate if intended as an electrical insulant, and the efficiency of the present key-coats and some novel key-coats are also discussed.

In the adhesives field the main application for melamine is as an accelerator for urea resin adhesives producing joints that are "boil-proof."

Guanamine-based resins are now being developed for use as assistants to both melamine resins and urea resins, and they may well become competitors of the melamines.

The most attractive members of this group are methyl guanamine, phenyl guanamine, and the halogenated phenyl guanamines. These compounds are capable of condensing with formaldehyde to form methylol compounds and, in addition to the resinous complex, the cationic colloidal dispersions are known.

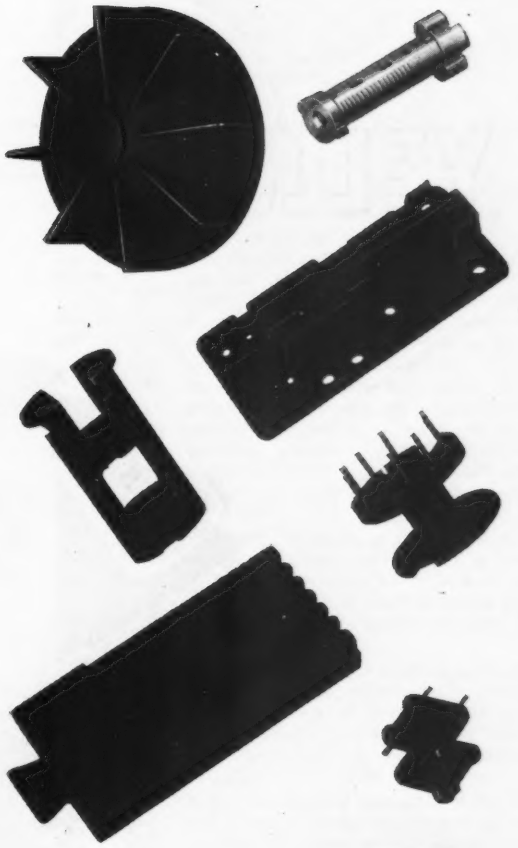
At this stage of their development the guanamines tend to be accepted as fortifiers for melamine and urea moulding powders, rather than as moulding powders in their own right.

Paint resins of the alkoxy methylol guanamine type, when used alone, produce films that are hard but brittle, the cohesive contraction being greater than their adhesion. By suitable plasticization the

Bring your Moulding problems to ROOTES!

Our specialised knowledge, gained through many years of meeting the requirements of all industries, is at your disposal. However complex the job, however intricate the design, our technical skill in the tool room combined with the most up-to-date precision equipment, and our scientific proficiency in the moulding shop, enables us to tackle your problems confidently, quickly and efficiently. Be it a small order for an intricate design, or an extensive run of a comparatively simple job, you will find our prices competitive, our service reliable and our workmanship first-class.

Whatever you need in plastic mouldings, we are confident that we can supply it — we welcome ALL enquiries.



ROOTES
MOULDINGS LTD

Contractors to M.O.S., Admiralty, etc. A.I.D. approved
SLOUGH · BUCKS · Telephone : Slough 22349

Smee's R.101

YELLOW – for safety

Matthey
CADMIUM PIGMENTS

Matthey cadmium pigments—ranging from greenish yellow through orange and red to a deep maroon—are as remarkable for their endurance as for their brilliance. To their power of resistance to the action of heat, mineral acids, alkalis and solvents is added great colouring power and exceptional light fastness.

Literature describing Matthey cadmium pigments and their applications is free on request. In addition we welcome enquiries regarding any pigmentation problems.

Johnson Matthey

JOHNSON, MATTHEY & CO., LIMITED, HATTON GARDEN, LONDON, E.C.1 Telephone: HOLborn 6989

F.2

adhesion to aluminium of finishes based on guanamine resins are superior to the corresponding melamines.

These guanamines are expected to be the subject of speculative investigations during the next three years.

Moulded and Extruded Polyamides and Polyesters. By W. C. Ferguson, B.S.C., Ph.D., Technical Service and Development Department, Imperial Chemical Industries, Ltd., Plastics Division

The group of synthetic polymers described as polyamides and polyesters are best known as fibre-forming polymers which are spun and highly oriented to produce the usable fibres. In recent years, this group of polymers has, in its turn, formed the basis of a new and rapidly growing family of plastics materials which is entering into all phases of industry. As a class, these new plastics show excellent mechanical properties, particularly high-tensile and impact strength, abrasion, chemical and temperature resistance.

The materials discussed in this paper are those covered by the generic term nylon and the polyester Terylene.

The basic types which are used commercially are as follows: polyhexamethylene adipamide, polyhexamethylene sebacamide, polycaprolactam, poly-ω-amino-undecanoic acid, polyethylene terephthalate. The range of materials available commercially is described, together with their properties.

In general, the new family of plastics can be manipulated by the standard processes used for thermoplastic materials. However, the softening point or range is much sharper or narrower than with materials like polythene or polystyrene and the viscosity of the melt low compared with these polymers. Careful design of injection moulding and extrusion machines is required, together with close temperature control and also a carefully controlled moisture and/or volatile content of the polymer to achieve the best results. These methods of manipulation are described together with the process of film casting.

Examples of applications are injection-moulded gear wheels, lock-nuts, household and mechanical goods. Extrusion grades are used for sheathing cables, for the production of strip for mechanical driving belts and for tubing. Polyethylene terephthalate is being extruded into film for electrical and packaging applications.

The polyamides and polyesters are of great interest in plastics technology because there exists the possibility of their being tailored and selected to have properties not covered by other forms of materials.

Silicones in the Plastics Industry. By J. H. E. Jeffes, B.Sc., Manager, Technical Service Department, Midland Silicones, Ltd.

The past two years have seen a steady development of silicone products, both by the improvement of existing types of materials and the introduction of new ones. Already some products are being made in this country, and it is expected that by the middle of 1953 a wide range of British-made products will be available.

In the field of plastics, particular interest has centred on the development of silicone resins for low-pressure laminates with glass-cloth and other heat-stable fabrics.

In the protective coatings field new silicone paint resins have been developed. Perhaps the most interesting development on these lines has been the production of silicone modified alkyd paint media and cold blending resins. These are used to produce paints having outstanding weathering characteristics.

Release agents have been developed for a number of specialized processes including the resin-bonded sand shell casting process and the moulding of organic-bonded laminates.

Silicone sizes are being intensively investigated for pre-treating glasscloth before laminating with organic resins. There is every indication that such finishes will assist in maintaining the strength of these laminates under humid conditions.

The use of silicones for surface treatment of plastics electrical components to improve their insulation resistance and anti-tracking properties is receiving considerable attention.

Silicone-bonded moulding powders have been developed from which high-impact strength parts may be made which have the outstanding electrical and heat-resistant characteristics typical of these resins.

REINFORCED PLASTICS—1

WEDNESDAY, JUNE 10, 10.15 A.M.

Surface Chemistry and Adhesion of Glass and Plastics. By H. Cole, M.A., F.R.I.C., F.S.G.T., Deputy Chief of Research, Pilkington Brothers, Ltd.

Assuming that adhesion is primarily a chemical process, and that polar molecules bond best to polar molecules, the first stage in the understanding of adhesion requires a knowledge of the forces which can produce chemical combination; and information concerning the surfaces of the materials to be combined.

A soda-lime-silica glass consists essentially of a random array of electrically charged anions and cations, arranged to produce electrical neutrality in any region in the body of the material, but with a tendency towards a state of unsaturation at the surface. The residual surface forces are minimized by (a) the phenomenon of surface tension (b) a surface accumulation of ions or molecules which decrease the surface tension, and (c) absorption and chemical combination with other molecules from the atmosphere. Glass surfaces are thus normally "hydrated" by reaction with water molecules. This is a most important factor when considering adhesion problems.

Various kinds of chemical bonding are possible to produce adhesion, the strongest and most useful, however, being normal covalent bonding. Since glass is a polar material good adhesion to plastics should be obtained by the use of intermediate coupling agents, which react with or bond strongly to the glass fibre surface for example, and to the plastics matrix. This may be exemplified by the behaviour of vinyl halo-silanes and of methacrylato chromic chloride.

Practical considerations of the bonding of plastics and glass fibres must take into account the characteristics desired of the size with which the fibre is coated immediately after formation, the purpose for which the fibres are to be used and the nature of the plastics to which adhesion may be required.

Plastics Containing Asbestos as a Reinforcing Filler. By P. H. Bishop, B.Sc., J. E. Gordon, B.Sc., and P. L. McMullen, D.L.C. (Aero.Eng.) Royal Aircraft Establishment Farnborough.

This paper is concerned with asbestos/resin combinations in which the asbestos acts as a reinforcing agent rather than as a simple filler. It has been shown that the mechanical properties of resin/asbestos compositions rise quite sharply as the fibre length of the asbestos increases. It is these long fibre materials and some of their mechanical properties which are discussed; particular attention is given to a commercially available product in which the reinforcement is chrysotile asbestos and the binder is a water-soluble phenol/formaldehyde resin.

A brief description is given of some of the ways in which this material may be moulded with special reference to the R.A.E. vacuum technique. Most of the test results given in this paper refer to material moulded in this way.

The mechanical properties as found by room temperature tests are reviewed together with the effect of varying resin content. Some of these mechanical properties have been determined over the temperature range of $-150°$ C. to $+350°$ C.

An investigation into some of the fatigue and creep properties has been made and an outline is given of the results of this investigation.

A brief discussion of asbestos in its several forms is included together with some of the properties of the more important reinforcing fibres, e.g., chrysotile, amosite, anthophyllite and crocidolite. Details are given of striking stiffness results obtained from some of these fibres when bonded by a phenolic resin; the high stiffness figures given by material with amosite fibre reinforcement is of particular interest. The full significance of fibre orientation is discussed with particular emphasis on the difficulty of orienting asbestos fibres. One conception of the ideal reinforced plastic is given. A few ideas are included on the potentialities of the materials, provided certain problems can be overcome.

A Critical Survey of Commercial Low-pressure Laminating Resins. By V. E. Yarsley, D.Sc., F.R.I.C., F.P.I., and A. G. Goodchild, B.Sc., A.R.I.C.

Increase in the production of low-pressure laminating resins and of laminates made therefrom, make desirable a rational terminology for these resins and laminates before the loose and irrational terms now so widely used become permanently fixed. To this end, the origin and development of the low-pressure laminating resins and of various descriptive terms is traced. A terminology for the various resins based upon their chemical characteristics and their functions is urged.

The chemical structures of various resin types are discussed in order to draw atten-

tion to differences of versatility and general properties. Particular reference is made to the heat resistance of the low-pressure laminating resins, since this is the property in which such materials compare least favourably with conventional materials of construction. An attempt is made to forecast the more probable lines of future development. The relative price and availability of each resin type is discussed and differences in handling techniques and properties of the laminates are illustrated by experimental results.

REINFORCED PLASTICS—2

WEDNESDAY, JUNE 10, 2.30 P.M.

Some Considerations in the Design and Manufacture of Structures in Glass Reinforced Material. By G. C. Hulbert, B.Sc., Development Engineer's Department, Bristol Aeroplane Co., Ltd. (Aircraft Division).

Advantages and disadvantages of glass reinforced materials fall broadly into three groups: financial, physical behaviour and workshop requirements. In the case of glass, it is perhaps more necessary than usual that the position of the material in each of these groups should be thoroughly understood before attempting to use it in a structure.

Taking the first, or financial group, one is confronted with the high raw material cost compared with competing metal. Against this can be set the possibility of very low construction and assembly charges in contrast to multipart metal fabrication. Even within the range of glass reinforcements available there is considerable variation in price and some consideration must be given to the future of woven and non-woven fibre materials.

When considering physical behaviour it is not sufficient to evaluate the material on the numerical values of its various properties alone. The great degree of control which the designer has over the orientation of the strength he requires within his structure will frequently offset the very modest properties of the material and will help him to achieve a structure of uniform stress at very moderate cost.

A major problem occurs when it is necessary to transmit loads from a glass laminate into a traditional structure, due to differing extensions under load of the metal and the plastics material. Intelligent design and efficient adhesion methods can do much to help, but this difficulty will always limit the efficiency of an essentially composite structure.

Workshop requirements need careful study in relation to the production quantities envisaged. Many techniques ideally suited to prototype construction are incapable of being extended beyond a limited output, while those most appropriate to the large production of small items entail capital expenditure which becomes prohibitive if the size of the product is increased.

In the absence of an efficient non-destructive test, inspection methods introduce another problem. For the production of a structure to be successful, every stage must be part of an overall conception commencing with the purchase of the raw material and ending only when the item is ready for dispatch.

Some Problems Associated with the Design and Manufacture of Asbestos-reinforced Plastics Structures. By D. S. Bancroft, A.F.R.Ae.S., Assistant Chief Designer, F. G. Miles, Ltd.

The paper covers two of the major problems associated with the development of asbestos-reinforced plastics structures, the first being the determination of the best method of fabrication for the particular problem in hand. This depends on the various requirements, such as quantities off and permissible tooling costs, the ratio of cost to weight of the component—namely, the possibility of increasing the strength/weight ratio of the product for an increase in tooling and/or manufacturing costs, and the function to which the product is to be put. Other less obvious factors, such as whether an early delivery date for a prototype is required or whether production tooling can be manufactured straight away, must be considered.

The second major consideration discussed in this paper is associated with the problem of designing a plastics structure to the actual requirements of the customer rather than the requirements which the customer thinks he wants, based on his experience of metal and wood. It is usually found that the requirements given to the plastics engineer are not the fundamental requirements of the problem, and at some later stage in the programme it is found that a more fundamental approach would have permitted a cheaper or otherwise better product to have been produced. A number of examples showing both cases where basic considerations have and have not been allowed for will be discussed in the paper.

DURABILITY AND PERFORMANCE—1

THURSDAY, JUNE 11, 10.15 A.M

The Durability of Plastics Under Post Office Conditions. By A. D. W. Downes, B.Sc., F.R.I.C., and A. A. New, M.Sc., F.R.I.C., Research Branch, Post Office Engineering Department.

Expenditure by the Post Office comes under three heads: capital cost of equipment, maintenance costs and operating costs. The materials used for Post Office equipment affect principally the first two of these, and in order to keep costs down to a minimum it is essential that equipment should be bought at a reasonable price, and above all that it should last for a long time with the minimum maintenance and replacement.

The durability of plastics in this connection means the extent to which plastics will last for a long time under Post Office conditions. Telephone exchanges which constitute a large part of the Post Office capital investment, are expected to last for 30 years, and any part of them not lasting this length of time may be considered to be failing in its object.

The failure of materials under Post Office conditions may be considered under three broad headings:—

(1) Those due to occasional accidental shocks, principally mechanical.

(2) Gradual wear of the materials.

(3) Gradual deterioration, or even merely alteration, of characteristics due to the ambient conditions.

Examples of the first class are types of damage to telephones due to the hand-set being replaced roughly or dropped on the floor.

The second class includes the repeated flexing and abrasion of telephone and instrument cords, and the damage by rubbing and washing of deaf-aid cords.

Many different mechanisms are responsible for the third class, such as the oxidation of materials by the action of atmospheric oxygen or ozone, deterioration by atmospheric sulphur dioxide or sulphuric acid, the depolymerization of certain compounds, the gradual flow of certain apparently hard plastics under mechanical stress, changes in mechanical and electrical properties due to absorption of atmospheric moisture, and failure due to biological attack.

In many cases plastics have advantages over the older materials under such conditions, but there is still room for improvement, particularly in their sometimes rather moderate mechanical properties.

DURABILITY AND PERFORMANCE—2

THURSDAY, JUNE 11, 2.30 P.M.

The Durability of Adhesives for Wood. By R. A. G. Knight, B.Sc.(Eng.), M.I.Mech.E., Officer-in-Charge, Composite Wood Section, Forest Products Research Laboratory.

The durability of adhesives for wood has been studied from the aspect of the user, and the results given in the paper derive from tests upon commercially-available glues.

The nature of durability is implicit in the definition of an efficient adhesive, viz., "one that maintains an adequate bond between the wooden elements under the conditions of exposure that the joint has to withstand."

There are four recognized ways of assessing the performance of adhesives:—

(1) From accumulated data upon their behaviour in service.

(2) By comparison of their behaviour with the standards set out in recognized specifications.

(3) By means of special laboratory-type tests devised to ascertain the effects upon joints of isolated factors occurring in practice.

(4) From the systematic observation and testing of glued products exposed to natural conditions over a number of years.

The relative merits of the four methods are examined and reasons given for the laboratory's preference for the natural long-term test.

A description is given of the Forest Products Research Laboratory's durability trials upon plywood and various built-up test-units bonded with animal, casein and various types of synthetic resin glues. This material has been exposed in England and Nigeria for periods up to 10 years in normally heated buildings and unheated ventilated sheds, in fields open to the weather, in water, and in boats.

Independent work of a similar kind has been done in the other forest products laboratories of the Commonwealth and the United States, and so close has been the agreement between the stations that a jointly-prepared classification has been issued that provides for three groups into which the different types of adhesives can be placed according to their durability.

(*Continued on page* 176)

PATENT REVIEW

The following abstracts have been made from specifications at the Patent Office, with the permission of the Controller of H.M. Stationery Office. The country of origin for Convention Applications is shown in parentheses. Complete specifications can be obtained from the Patent Office, 25, Southampton Buildings, London, W.C.2, price 2s. 8d. each (including postage).

This month the space devoted to Patent Review has been increased to deal with the increasing number of patents which are published each month relating to high polymers, plastics materials, processes and applications.

B.P. 681,285. Copolymers of vinyl chloride and styrene. To: B. F. Goodrich Co. (U.S.A.).

Presence of monomeric styrene does not inhibit the emulsion polymerization of vinyl chloride, provided the proportions of styrene and vinyl chloride are carefully controlled (90 to 99% vinyl chloride to 1 to 10% styrene), and when a particular "redox" catalyst is present. The copolymers are soluble in cheap solvents. They are especially stable to light, heat, corrosive materials. They may be cast and moulded without plasticizer to form clear translucent compositions.

B.P. 681,314. Firemen's helmets. James Hendry, Ltd., J. Hendry.

The helmet has a "Perspex" visor to be raised or lowered.

B.P. 681,324. Fluid dispenser. To: Merck and Co. Inc. (U.S.A.).

The spout tip material may be one of the ethylene polymers, vinyl polymers or other plastics of sufficient rigidity and elasticity, while the cap is made of metal or non-elastic plastics such as phenolic resins.

B.P. 681,366. Bobbins for use in textile machinery. P. H. Lindley.

B.P. 681,386. Interpolymers. To: United States Rubber Co. (U.S.A.).

The method is intended to increase the yield of soluble convertible polymeric material, a copolymer of a castor-oil maleate with mono-olefinic compound. The maleate is inter-polymerized with styrene and with a 2-propenyl compound.

B.P. 681,392. Granular polymerization of polymerizable liquid organic compounds. To: E.I. du Pont de Nemours and Co. (U.S.A.).

Methyl methacrylate is suspended in an aqueous vehicle in the presence of sodium hypophosphite with an azo compound as polymerization catalyst.

B.P. 681,396. Driving belts. E. Pollard. To: Flexicon Ltd.

The circular section belt made of rubber or a rubberlike plastic (polyvinyl chloride) core and a spiral wrapping of cotton threads is formed and moulded under heat and pressure.

B.P. 681,429. Waterproofing of protein plastics. S. H. Pinner, A. D. Whitehead. To: B.X. Plastics Ltd.

The waterproofing action of a combination of mononuclear aromatic monocarboxylic acid and formaldehyde is used.

B.P. 681,488. Identification bracelet. Whitfields Bedsteads Ltd., C. G. Whitfield.

A polyethylene band for babies.

B.P. 681,494. Anti-sticking cellulose film. To: American Viscose Corp. (U.S.A.).

B.P. 681,505. Method of making abrasion-resistant coatings containing vinyl chloride-vinylidene chloride copolymers. To: Dow Chemical Co. (U.S.A.).

B.P. 681,510. Production of porous masses and shaped articles from polymers. To: Badisch Anilin-und Soda-Fabrik (I. G. Farben) (Germany).

A raising agent, capable of splitting off gas, is dissolved in a monomeric polymerizable ethylene derivative.

B.P. 681,517. Articles comprising ethylene polymer. To: E.I. du Pont de Nemours and Co. (U.S.A.).

To enhance the slip (e.g., in automatic packaging machinery) and prevent accumulation of electrostatic charges, one or more watersoluble alkyl aryl polyglycol ethers of a certain formula are uniformly distributed over the surface of films or sheets.

B.P. 681,524. Apparatus for the treatment of calender rolls of a calender for sheeting plastic material into film. To: Wingfoot Corp. (U.S.A.).

B.P. 681,558. Manufacture of gloves and other articles. A. K. Haworth.

The material is a fabric, coated or impregnated with a synthetic resin (polyvinyl chloride). No handling of the carriers is necessary after dipping until the resin-coated glove is in its finished state (continuous process).

B.P. 681,576. Closure for containers and a method of applying same. J. C. de Shazor, Junr. (U.S.A.).

B.P. 681,578. Composition of matter curable to give a hard resinous product, the resulting resinous product and articles made therefrom. To: NV de Bataafsche Petroleum Maatschappij (U.S.A.).

The composition contains a glycidyl ether. Coating compositions, putty-like compounds and mouldable products may be obtained. Pigments and other resinous products may be added.

B.P. 681,581. Resinous compositions. To: Monsanto Chemical Co. (U.S.A.).

Plasticized vinyl chloride resins useful over wide ranges of temperatures are produced.

B.P. 681,616. Calenders for sheeting and like operations on plastic materials. To: Wingfoot Corp. (U.S.A.).

A wedging device can instantaneously relieve pressure between the rolls. This facilitates calendering of thin polyvinyl chloride sheets.

B.P. 681,641. Thermoplastic composition. J. C. Arnold. Comm. from: Bonafide Mills Inc.

Drying oil, pitch and compatible unsaturated petroleum polymer is embodied in the composition, which may have incorporated a wide range of colouring pigments. Wall, floor coverings, table tops may be made.

B.P. 681,706. Diffusing screens. M. Kilemnik (Switzerland).

The strips of the honeycomb structure ("egg-box") for diffusing the light from a tubular source are formed with depressions or protrusions; the strip is thus made non-transparent.

B.P. 681,803. Composition sheet material and methods of manufacturing the same. To: Congoleum-Nairn Inc.

The binder for a floor and wall covering sheet material (25-50% binder, 75-50% pigment filler and fibrous filler) is a thermoplastic elastomeric polymer selected from polyvinyl chloride, acetate, butyral and a copolymer of vinyl chloride and vinyl acetate and plasticizer.

B.P. 681,864. Plasticized vinyl chloride polymers. To: Monsanto Chemical Co. (U.S.A.).

A sulpho ester of a certain formula is dispersed in the polymer imparting to the composition unusual flexibility and high stability at elevated temperatures.

B.P. 681,869. Package of pills, tablets or the like. To: Strong Cobb Development Co. (U.S.A.).

Dispensing individual dosages while retaining the tough protection of the "Cellophane" film, which prevents accidental opening, is facilitated by heat-sealing laterally and longitudinally intersecting zones of two opposed sheets around embossed areas forming containers. The sealing zones are also embossed to interdigitate the material.

B.P. 681,941. Flexible strip fastenings. H.F.E. Cirket.

The strip edges are formed by extrusion e.g. from polyvinyl chloride.

B.P. 681,991. Resinous products. To: NV de Bataafsche Petroleum Maatschappij (U.S.A.).

Surface coatings, varnishes, mouldings, adhesives, films, fibres are made by compounding and reacting glycidyl ethers with phosphorus containing compounds.

B.P. 682,023. Production of porous sheets from viscose. To: Vereinigte Glanzstoff-Fabriken A.G. (Germany).

15 to 50% plasticized polyvinyl compound, 15 to 50% viscose and 25 to 50% of a water soluble salt (poreformer) are spread out and heated. The salt is then washed out.

B.P. 682,038. Solutions of polymeric chlorotrifluoroethylene. To: British Thomson-Houston Co. Ltd. (U.S.A.).

Uniform and homogeneous coatings, e.g., on magnet wire are made from a mixture of finely divided polymeric chlorotrifluoroethylene (any solid polymer thereof) and certain aromatic hydrocarbons. Other applications are: moulding compositions and laminated products.

B.P. 682,050. Process for making microporous objects from vinyl chloride polymers. To: National Cash Register Co. (U.S.A.).

Briquettes are shaped from particles of polyvinyl chloride and a filler together with a plasticizer forming a semi-moist loosely granular cohesible mixture. After heat treatment, the filler particles are leached out leaving a continuous network of p.v.c.

B.P. 682,058. Production of cyclohexyl amine lactate. R. G. Rowe. To: Dictaphone Corp. (U.S.A.).

B.P. 682,065. Manufacture of synthetic resins. To: Arco Co.

Reaction at resin-forming temperature of (a) a non-gelled interpolymer of a monovinyl-aromatic compound (styrene) with a certain conjugated drying oil (b) a polyhydric alcohol (c) a polybasic organic acid

produces excellent surface coatings and films.

B.P. 682,073. Sporting cartridge cases. C. Paris.

The case of moulded plastic material is characterized by a tapered or countersunk shoulder defining the volume of the explosion chamber independently of the powder charge.

B.P. 682,078. Manufacture of surface covering sheets. J. C. Arnold. Comm. from: W. Rowe, S. A. Cohen.

An oil-soluble heat-reactive phenol-formaldehyde condensation product and a mixture of resin acids and unsaturated high molecular weight fatty acids form the binder for fillers and pigments on a backing sheet.

B.P. 682,089. Feeding of labels, sheets and the like. A. G. Rose. To: Rose Brothers (Gainsborough) Ltd.

To prevent adhesion the operative face of a transfer member is formed from or covered with polytetrafluoroethylene.

B.P. 682,158. Casting layers for films and sheets. F. L. Shouteden. To: Gevaert Photo-Producten NV.

Partially hydrolised hardened polyvinyl acetate offers certain advantages as casting layer.

B.P. 682,168. Copolymers. E. G. Bobalek. To: Arco Co.

1. A non-gelled interpolymer of (a) a monovinyl-aromatic compound monomer (styrene) (b) a monocarboxylic olefinic acid (c) a compound selected from a group including unsaturated and conjugated drying oil fatty acids and esters and a certain polyhydric alcohol, form a new basis for surface coatings and films.

B.P. 682,169. Production of thermoplastic compositions. Semtex Ltd., W. Saul, L. H. Griffiths.

The composition incorporates a fusible resinous material (coumarene-indene resin; naphthalene-formaldehyde resin) in a polymer (or copolymer) of vinyl chloride. The material is used for wall facings, floor tiles, etc.

B.P. 682,175. Process for colouring films, foils, fibres and fabrics formed of polyvinyl derivatives. P. May. Com. from: Sandoz Ltd.

The materials are treated with an aqueous emulsion containing besides the dye stuffs, two organic liquids one of which has a hardening action, the other a swelling action.

B.P. 682,180. Method of copolymerization and products obtained thereby. To: American Viscose Corp. (U.S.A.).

The copolymer is obtained from monomeric acrylonitrile and monomeric vinyl acetate or monomeric styrene.

B.P. 682,181. Polymerization process. To: American Viscose Corp.

A simple, readily reproducible method for producing polymers from organic vinyl-containing substances comprising polymeric chains of uniform length (polyacrylonitrile).

B.P. 682,184. Process and apparatus for melting linear high polymers of organic substances. To: Phrix-Werke A.G. (Switzerland).

B.P. 682,194. Manufacture of organic pigments and moulding powders. Calico Printers' Association Ltd., L. A. Lantz, A. Schofield.

Polyvinyl benzals are produced using up to 20% polyvinyl alcohol in the reaction mixture and effecting reaction at pH 0.5-2.6.

B.P. 682,252. Plastic clockwork motors. Cascelloid Ltd., K. Borchard.

The gear wheels of the miniature (toy) motors are made of plastic material. The first wheel on the driving shaft and a side plate enclose a spirally wound spring inserted with one end into a groove in the shaft formed, e.g., by injection moulding, requiring less space that the usual helical springs.

B.P. 682,253. Copolymers of vinyl chloride and vinylidene chloride. To: NV de Bataafsche Petroleum Maatschappij (Netherlands).

B.P. 682,254. Process for the production of copolymerization products of homogeneous composition and the products thus obtained. To: NV de Bataafsche Petroleum Maatschappij (Netherlands).

B.P. 682,289. Suspensions of polymeric chlorotrifluoroethylene. To: British Thomson-Houston Co. Ltd. (U.S.A.).

B.P. 682,313. Method of making an expanded material and the product resulting therefrom. C. L. Wilson (U.S.A.).

Sponge material, synthetic chamois skin, etc., is produced from polyvinyl alcohol reacted with formaldehyde in the presence of an acid catalyst while bubbles are formed (by air; by chemical means) in the reacting mixture.

B.P. 682,314. Methods of making electrically-conducting patterns, such as wiring circuit, coils and the like. E. Cholot. To: Electric and Musical Industries Ltd.

A sheet of insulating material (Bakelite) and a synthetic-resin adhesive (Bakelite Grade J. 11185) may be employed for making a rigid sheet, including a metal foil, by passing through heated calender rolls.

B.P. 682,319. Production of plastic compositions. Anglo-Iranian Oil Co. Ltd., J. A. Conyers, R. A. Dean, F. A. Fidler.

A polymer (copolymer) of vinyl chloride is mixed with a polymethylene sulphone, or an alkyl derivative thereof.

B.P. 682,351. Packing rigs. H. M. Haigh, L. A. R. Waring, E. L. Dawson. To: Turner Brothers Asbestos Co. Ltd.

A thin tape of polytetrafluoroethylene is wrapped toroidally around an annular asbestos core.

B.P. 682,352. Spectacles. L. S. Jay, J. Benson. To: L. S. Jay, H. J. Henry.

B.P. 682,379. Ice forming cups or the like for use in refrigerators. A. C. A. Squire. To: Plastray Products (Birmingham) Ltd.

The material may be polyethylene.

B.P. 682,399. Production of polyaminotriazoles. F. G. Kleinschrod, J. W. Fisher. To: British Celanese Ltd.

B.P. 682,406. Process for improving paper by treatment with resins. J. M. Danner, W. Zerweck (Germany).

The resins are condensation products of aminotriazines, hydroxyaldehydes and polyvalent alcohols.

B.P. 682,412. Stretching of filaments, yarns, films and similar shaped articles comprising acrylonitrile polymers. To: American Viscose Corp. (U.S.A.).

B.P. 682,415. Preparation of polymerized methyl methacrylate sheets. To: E. I. du Pont de Nemours and Co. (U.S.A.).

Perfectly transparent sheets are obtainable by adding water to the liquid methyl methacrylate so that it is at least 70% saturated at the temperature at which it is distributed on an aqueous salt solution (of magnesium chloride or lithium chloride; of many other metal salts if a certain haze is permissible).

B.P. 682,420. Polymerization of ethylene. To: E. I. du Pont de Nemours and Co. (U.S.A.).

Solid polymers are made using an oxidizing agent (peroxide) as catalyst in combination with a certain metal ion.

B.P. 682,473. Cutting artificial filaments into short lengths. R. H. Speakman. To: I.C.I. Ltd.

Synthetic linear polyamides and synthetic linear polyesters are so tough that cutting is difficult (e.g., for staple fibre production). By shaping the cutting edge so that it is drawn across the filaments while moving them past the blade, the difficulties were overcome.

B.P. 682,480. Liquid reservoirs. L. Coatelen (France).

Polymethyl methacrylate may be used.

B.P. 682,488. Organosiloxane copolymers. To: Dow Corning Ltd. (U.S.A.).

Further copolymerization with, e.g., octamethyl-cyclotetrasiloxane yields high polymer liquids useful as special lubricants for plastics.

B.P. 682,539. Moulds for producing articles of resilient plastic material. P. W. Thornhill. To: Levitation Ltd.

The mould is suitable only for articles having certain shapes of depressions or projections (nylon packing ring). It is made up of two main portions, one of which is again subdivided and incorporates the depressions or projections. The movement of the parts enables an ejector to force the moulded article off the mould.

B.P. 682,541. Polymerization of organosiloxanes. E. L. Warrick. To: Dow Corning Ltd. (U.S.A.).

B.P. 682,543. Production of extruded sheets, films and the like of organic thermoplastic material. J. R. Cann, P. Ions. To: I.C.I. Ltd.

Compositions such as those containing vinyl chloride polymers may be directly fed to the extruder in powdered form without the usual hot working by providing the extruder with an extension barrel enclosing a metering screw. The barrel has a slit along the screw through which the material fed to the screw continuously in the plastic state is extruded.

B.P. 682,563. Writing pad. P. Adler (Switzerland).

Frame and base plate are moulded of polystyrene or the like. A magnet is fitted to hold the writing instrument of suitable material.

B.P. 682,575. Tubular wall plugs. To: H. J. Van Der Rijn N.V. (Netherlands).

The plug may be of a thermoplastic such as polyvinyl chloride.

B.P. 682,609. Calendars and other like indicators. W. S. Bennet.

B.P. 682,677. Urea-aldehyde type resin compositions containing latent curing catalysts. J. Mariam (Sweden).

To obtain storable condensation products, certain substances are added to the primary condensation solution.

B.P. 682,685. Casein plastics. British Glues and Chemicals Ltd., H. J. Stern, L. E. Shadbolt, Charles Horner Ltd.

Incorporation of melamine imparts greatly improved resistance to water and moisture.

B.P. 682,689. Process of preparing a copolymer of vinylidene chloride and acrylonitrile and moisture-proof sheet wrapping materials prepared therefrom. W. Berry, C. R. Oswin, R. A. Rose. To: British Cellophane Ltd.

Eighty to 92% monomeric vinylidene chloride and 20 to 8% monomeric acrylonitrile form the basic mixture. The sheets are highly resistant to water-vapour penetration.

B.P. 682,692. Bobbins. E. P. Brook. To: Brook and Burgess (Plastics) Ltd.

B.P. 682,702. Resin dispersion coating compositions and method of making same. To: Armstrong Cork Co. (U.S.A.).

Vinyl resin coatings for floor and wall coverings are made from a dispersion of a vinyl chloride polymer and a plasticizer, reducing the viscosity by adding butylated urea-formaldehyde resin. The viscosity is then adjusted by additional plasticizer and a diluent.

B.P. 682,736. 2, 5-substituted 2, 5-dihydrofurans. To: Kemisk Vaerk Koge A/S (Denmark).

The compounds may be used as solvents and intermediates in the manufacture of plastics.

B.P. 682,771. Copolymerization of aromatic divinyl compounds and isobutylene. To: Standard Oil Development Co. (U.S.A.).

Copolymers of isobutylene and divinylbenzene are particularly adapted as pressure sensitive adhesives.

B.P. 682,776. Joints for sheet material. W. Cookson.

B.P. 682,791. Architectural multiple-model-building system or toy. A. E. M. Brown, D. J. Rosten (Australia).

The panels of varying shapes provided with spring clips may be made from plastics.

B.P. 682,812. Brushes. R. Addis. To: Addis Ltd.

The plastic stock of the hair brush may be injection moulded with a flat tapered slot for accommodating a tapered comb.

B.P. 682,816. Stereoscopic transparency holder and method and apparatus for forming such a holder. K. F. Kurz.

The blanks to be shaped by pressure and heat are preferably of a phenolic resin.

B.P. 682,857. Colouring matters and process for colouring plastic materials therewith. I.C.I. Ltd., J. Cookson, H. J. Twitchett.

When a rhodamine dyestuff is precipitated in the form of its zinc chloride double salt on a lake base, brilliant shades are obtained on plastic materials. The coloured plastics show much less darkening in light than those plastics coloured with the original rhodamine.

B.P. 682,859. Assembling of elastic articles in rigid apertures. R. S. Vincent, H. Walker. To: British Dielectric Research Ltd.

Polytetrafluoroethylene has the property known as "elastic memory," i.e., it does not return immediately to its original dimensions (after compression in one direction) on removal of the compressing force. This property is used for assembling bushings in wireless receivers.

B.P. 682,862. Production of artificial resins from indole and aldehydes. J. B. Lings. Comm. from: Ges. fuer Teerverwertung m.b.H.

The meltable, soluble resins can be hardened by heating, after or during moulding, with or without filler.

B.P. 682,911. Interpolymers and the production thereof. R. J. Wolf. To: B. F. Goodrich Co. (U.S.A.).

A new class of vinyl resins is obtained by polymerizing monomeric mixtures of vinyl chloride, a higher alkyl acrylate, and isobetene. No plasticizer is required for materials of softness and flexibility, clarity and transparency, resistant to heat and light, and able to be fabricated at lower temperatures.

B.P. 682,914. Interpolymers. To: B. F. Goodrich Co. (U.S.A.).

A new class of vinyl resins processable without plasticizer and of improved toughness and strength is produced by polymerizing mixtures of vinyl chloride, a certain alkyl acrylate (octyl acrylate) and acrylonitrile.

B.P. 682,928. Manufacture of ice lollipops. A. A. Fronch, A. N. McGregor.

The mould with a certain rib arrangement may be made by injection moulding from polystyrene.

B.P. 682,945. Method and apparatus for forming laminated panels of like articles. F. Lyijynen. To: Briggs Mfg. Co.

Before superimposing the sheets, they are treated with a thermosetting resin (in a bath of a phenol formaldehyde, a urea formaldehyde, a melamine resin; by coating or spraying). They are heated and dried for partial curing and then combined under pressure and heat for further curing of the resin which, however, is not complete. Final curing is effected in a special forming fixture by utilizing residual heat.

B.P. 682,967. Thermoplastic synthetic resins. M. Kaufman, A. F. Williams. To: C.D. Patents Ltd.

The softening point of the new acenaphthylene-styrene copolymers is higher than that of polystyrene as previously produced.

B.P. 682,969. Organo-polysiloxanes. To: Monsanto Chemicals Ltd. (Belgium).

B.P. 682,986. Containers or barrels with a bung or closure of transparent or translucent synthetic resin. J. C. J. Evenblij. To: Evenblij-Vaten N.V.

B.P. 682,997. Process for the manufacture of sheet-metal containers lined with heat-hardened synthetic resins. E. Juhling.

The interior of the container is treated with steam (steam distillation process).

B.P. 682,999. Production of polyaminotriazoles. F. G. Kleinschrod, J. W. Fisher. To: British Celanese Ltd.

B.P. 683,059. Interpolymers. To: B. F. Goodrich Co. (U.S.A.).

Vinyl chloride, octyl acrylate, and a divinyl aryl hydrocarbon or a dialkenyl ester of an olefinic dicarboxylic acid are polymerized in an aqueous medium. For processing at moderately elevated temperatures, no plasticizer is required. The products are rigid and of high strength.

B.P. 683,067. Laminar product of polymerized vinyl chloride resin and comminuted cork and process of manufacturing the same. To: Dodge Cork Co. Inc.

B.P. 683,068. Electrical insulating materials. To: Soc. des Usines Chimiques Rhône-Poulenc. (France).

If asbestos is agglomerated with a mixture of a methyl or methyl phenyl polysiloxane resin and of ethyl polysilicate the quantity of polysiloxane resin may be considerably reduced thus making the material insensitive to moisture and resistant to heat.

B.P. 683,124. Light diffusing screens for use with illuminating means. A. H. Brackensey. To: Franco-British Electrical Co. Ltd.

Light losses are reduced by using a screen with spaced slots along one edge of strip components. Part of the strip is rendered translucent. The strips are moulded from polystyrene with one irregular (light diffusing) surface.

B.P. 683,126. Preparation of styrene interpolymer compositions. L. E. Cadwell, J. C. Petropoulos. To: American Cyanamid Co. (U.S.A.).

Styrene and one or more oil-modified alkyl resins are reacted in the presence of a tertiary alkyl substituted di- or hydroperoxide as a catalyst.

B.P. 683,156. Polymerization of vinyl acetate. G. Benson, R. L. Perks. To: Shawinigan Chemicals Ltd. (U.S.A.).

As emulsifying agent, a polyvinyl alcohol (or mixture) is used with a peroxide catalyst and, as a dispersion agent, the sodium salt of a condensation product of formaldehyde with an alkynated naphthalene sulphonic acid.

B.P. 683,169. Manufacture of thermosetting aminoplastic moulding compositions in granular form. To: British Industrial Plastics Ltd. (U.S.A.).

Briquettes are formed from finely ground and heated powder, which are then granulated and screened.

B.P. 683,209. Production of composite articles, structures and the like containing polythene. H. Zenftman, I.C.I. Ltd.

Polythene has an unusually low capacity for adherence to other materials. Artificial resinous polymeric aromatic phosphoric esters of a certain kind are excellent adhesives for polythene and thus afford the possibility of applying an intermediate coating as a bonding surface between polythene and some other material.

B.P. 683,217. Extrusion dies for making tubes from rubber, plastic materials and the like. William Walker and Sons Ltd., F. L. Hampson.

An intermediate expansion chamber of certain dimensions enables the extrusion of tubes of large diameter without requiring a correspondingly greater diameter of the feed screw involving high cost.

B.P. 683,218. Processing of linear polyester materials. L. W. Pickup. To: Calico Printers Assoc. Ltd.

By treatment with sulphuric acid, the dyeing properties of the material (chips, powder, sheets, films, textiles) can be improved (dyes darker, more evenly and rapidly).

B.P. 683,239. Manufacture of cores and moulds for hollow metal castings. L. Hearnshaw. To: Stanton Ironworks Co. Ltd.

The interior surface of a heated metal core box is covered with a plastic mixture of sand and a liquid thermosetting synthetic resin introduced between internal former and core box and consolidated by vibration. The same plastic mixture may be applied to the exterior surface of a heated metal pattern to produce a rigid, hollow porous shell.

B.P. 683,303. Thermal stabilization of polymeric methyl methacrylate. To: E. I. du Pont de Nemours and Co. (U.S.A.).

The granular polymerization is carried out in the presence of an aliphatic monosulfide. The polymer is then heated until the sulfide is activated as a thermal stabilizer. The moulding powders (for injection moulding) have higher thermal stability than known powders.

B.P. 683,329. Polymerization of styrene. A. Abbey. Comm. from: Dow Chemical Co.

The polymerization is effected in three vessels the monomeric styrene held first at a temperature of 80° to 100° C., then passing through the second vessel with a temperature gradient with higher temperature at the exit, finally through a non-oxidizing or inert atmosphere.

B.P. 683,403. Manufacture of artificial filaments and related articles. To: Celanese Corp. of America (U.S.A.).

B.P. 683,450. Ethyl cellulose composition containing ditertiaryoctyl diphenyloxide. E. L. Kropscott, P. H. Lipke. To: Dow Chemical Co.

The composition rapidly hardens after extrusion or compression or injection moulding forming articles of great hardness, impact strength and lower water absorption; recommendable for electrical insulation.

B.P. 683,451. Interpolymers. To: B. F. Goodrich Co. (U.S.A.).

Alkyl acrylate, styrene and vinyl benzoate in certain proportions form strong, flexible, clear, non-tacky films insensitive to water and firmly adherent to metallic and other surfaces.

B.P. 683,473. Process for ornamenting sheet material. C. R. Riley, R. J. Goodson.

Thermoplastic resin sheets are sandwiched between templates, one of which has rows of holes, the other having corresponding depressions. A heated tool presses portions of the resin sheet reached through the holes into the depressions to form lampshade material.

B.P. 683.504. Production of polyurethanes. To: Celanese Corp. (U.S.A.)

B.P. 683.510. Method of making crinkled artificial fibres. L. V. Jones. To: Dow Chemical Co.

The method relates to normally crystalline "Sarans" (polymers and copolymers of vinylidene chloride).

B.P. 683,553. Collapsible tubes and other containers having screwed nozzles adapted to be closed by caps. John Dale Ltd., A. A. Giblin.

A nozzle may be formed as a unit separate from the metal container (tin, tin and lead alloy) if of not completely rigid material retaining slight resiliency so that it can be forced through, and sets in, an aperture of the container. Suitable nozzle materials are polyethylene, polyvinyl chloride.

B.P. 683,560. Synthetic resin fire-retardant compositions To: Monsanto Chemical Co. (U.S.A.).

A protective coating is applied which contains, i.a., a thermosetting resin (butyl ethers of melamine—or urea-formaldehyde condensation products or mixtures of both).

B.P. 683,572. Fireproofing compositions and methods of making the same. J. E. Malowan, P. R. Hurley. To: Monsanto Chemical Co.

A compound combining nitrogen and phosphorus may be employed, i.a., in resinous materials. Combined with certain resins it exhibits the phenomenon of intumescence.

B.P. 683,610. Device for use in moulding plates and other flat objects made of polymerized synthetic resinous material. To: Ceskoslovenské Chemické Závody N.P. (Czechoslovakia).

The mould plates are resiliently gripped by a fixed sideplate and three movable sideplates. The resilient gripping faces permit movement of the mould plates towards each other on shrinkage of the plastic material.

B.P. 683,622. Spinnerets and their method of production. J. D. McClure Mackay, A. W. S. Clark, I.C.I. Ltd.

A laminated structure is formed of parallel filaments which can be removed by chemicals separated by layers unaffected by these chemicals. A solid block of synthetic resin surrounds the laminated structure. This is cut into plates, the plates are subjected to the chemical treatment which removes one part of the filaments, thus producing a multi-hole synthetic resin spinneret.

B.P. 683,630. Urea-melamine-formaldehyde resins. A. White. To: I.C.I. Ltd.

Process for the preparation of stable resin syrups.

B.P. 683,634. Processing of linear polyester materials. W. Shaw, L. W. Pickup. To: Calico Printers Assoc. Ltd.

B.P. 683,655. Copolymers of vinylidene cyamide with aliphatic conjugated diolefins. S. J. Averill. To: B. F. Goodrich Co. (U.S.A.).

B.P. 683,746. Lamp-shades. G. Barber.

Panels of polyvinyl chloride are welded together and applied over a rigid frame.

B.P. 683,853. Lamp-shades. H. C. Leech (South Africa).

B.P. 683,875. Production of vinyl chloride. To: Soc. Belge d'Azote et des Produits Chimiques du Marly (Belgium).

The normal process is modified by arranging in front of the chamber containing the mercuric chloride catalyst, a similar chamber operating with nickel chloride.

B.P. 683,885. Protective book cover. A. J. Wells.

Polyvinyl chloride is the preferred material.

B.P. 683,897. Adhesive tab-labels for use on fabrics in laundering, dry-cleaning and similar processes and for identification during other operations. Lakeland Laundries Holdings Ltd., J. J. Commins, J. Baty.

Part of unwoven fabric is coated on one side with a plasticized polyvinyl chloride adhesive, on the other side with a cellulose acetate film including china clay.

B.P. 683,912. Mouldable compositions of matter comprising siloxanes and inorganic filler materials. To: Diamond Alkali Co. (U.S.A.)

Heat resistant resinous compositions, e.g., for electrical instrument panel boards, etc., made from a mixture of a phenyl silicon trihalide and an ethyl silicon trihalide in certain proportions and an inorganic filler (asbestos).

B.P. 683,914. Siloxane-containing compositions of matter. To: Diamond Alkali Co. (U.S.A.)

Resinous siloxanes are suitable as bonding materials for friction elements. Copolymers of the butadiene-acrylonitrile type (Hycar) may be included as plasticizers.

B.P. 683,918. Production of melamine-formaldehyde condensation products. G. Swann. To: Beck Koller and Co. (England), Ltd.

B.P. 683,927. Adhesive tapes and liners having low adhesion coatings. J. O. Hendricks. To: Minnesota Mining and Mfg. Co. (U.S.A.)

The coating (not exceeding 0.00001 in. thickness) is formed of a copolymer of an ester of certain acrylates and methacrylates and an acid of a certain class of acrylic acid and methacrylic acid.

BRITISH PLASTICS CONVENTION, 1953

(*Continued from page 172*)

Durability of adhesives for wood (*continued*)

Group I—Weatherproof adhesives.—Adhesives that by systematic tests and their record in service have proved virtually indestructible by weather, micro-organisms, hot and cold water, and dry heat. Such glues are more durable than the wood itself.

Group II—Moisture-resistant adhesives.—To this group belong those glues that offer considerable resistance to severe conditions for a limited time, but they deteriorate slowly, and ultimately fail completely. They are, however, satisfactory under conditions less exacting than those applicable to the weather-proof group. A wide range of glues is included in Group II and it is convenient to subdivide them according to their resistance to micro-organisms. This terms covers moulds and bacteria, but for convenience of reference, "mould" will be assumed to include bacteria.

Group IIA—Moisture-resistant-Mould-proof.

Group IIB—Moisture-resistant-Mould-susceptible.

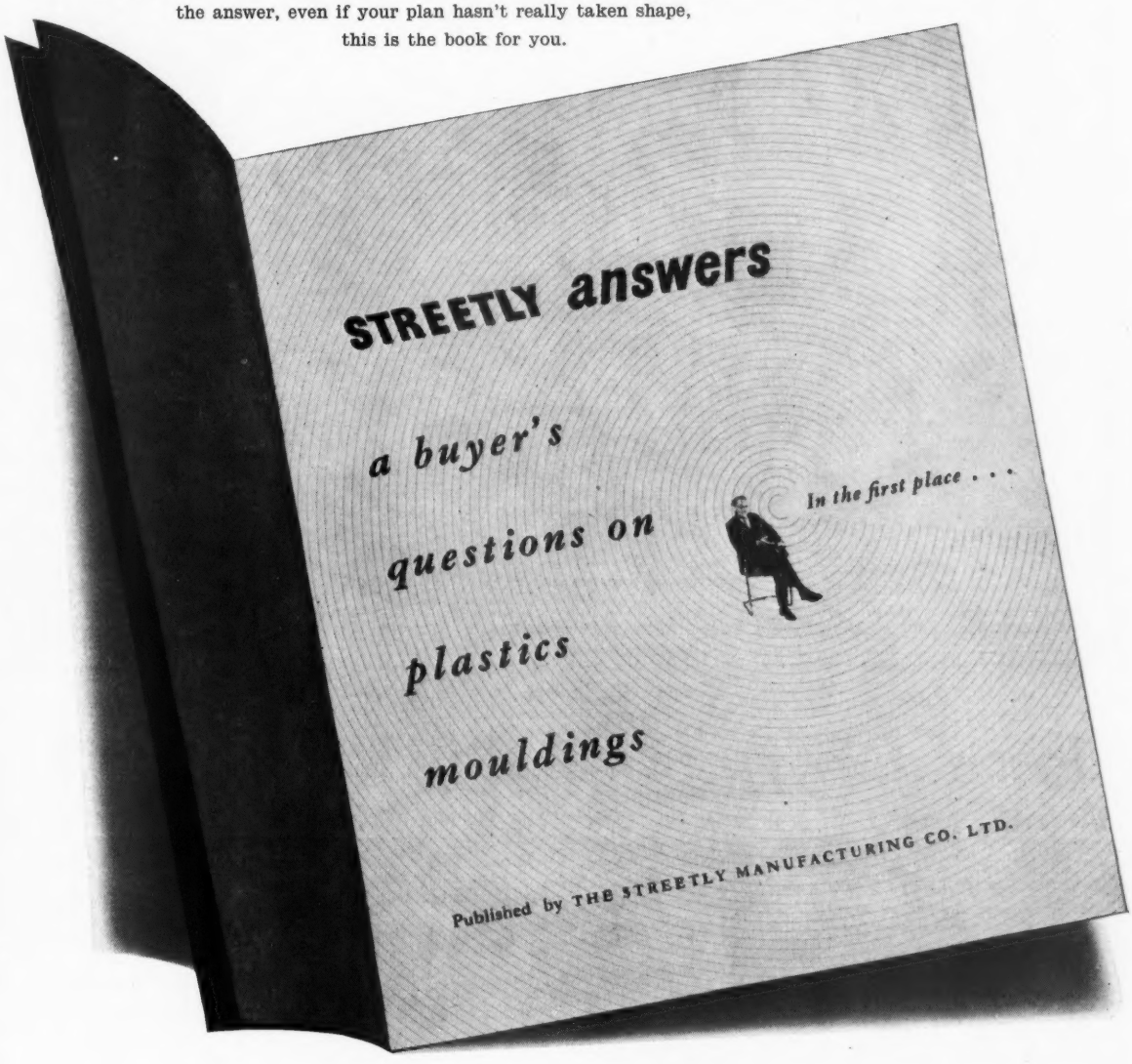
Generally speaking, glues of Group IIA retain a greater proportion of their joint strength when wet than those of Group IIB.

Group III—Interior adhesives.—Adhesives such that joints made with them fail completely under the action of water or dampness alone.

A laminated product is still mainly wood, to which even the most durable glue imparts no extra protection against fungal attack. Treatment with a preservative is thus sometimes required and the effects of this on the adhesive are considered. In conclusion, it is pointed out that no glue can function efficaciously unless it is correctly applied by the user.

LET US SEND YOU THIS BOOK

If you're interested in plastics. If you've got a plan where mouldings could be the answer, even if your plan hasn't really taken shape, this is the book for you.



'STREETLY ANSWERS'

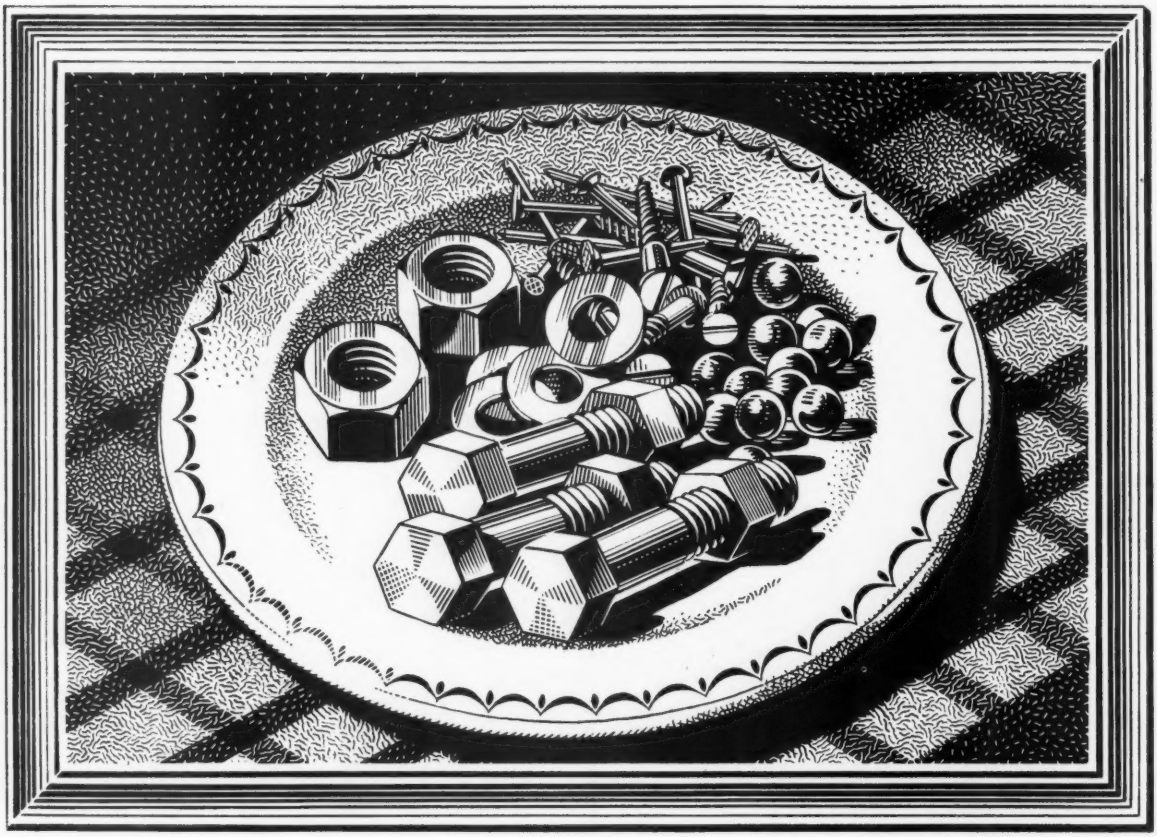
In this book we deal with most of the initial questions that might come to mind about plastics. We tell you about the kind of mouldings we make, who our clients are, what kind of service we can give you. "Streetly Answers" shows you drawings, blueprints and photographs, traces the manufacture of one particular job from start to finish. We'll send you this book gladly, and if there is anything else you want to know, just ask us about it.

B·I·P GROUP

Write for 'STREETLY ANSWERS' to:

THE STREETLY MANUFACTURING CO. LTD., STREETLY, SUTTON COLDFIELD, NR. BIRMINGHAM

Telephone: Streetly 78411. Telegrams: Bang Streetly



Who'd refuse another helping?

Would you? Even though steel is no ingredient in plastic you cannot make plastic without the help of steel—steel machinery and tools. And roughly half this country's supplies of new steel are made from scrap. This scrap comes from factories like yours. Keep on turning in your scrap, and you will be doing your best to see that the plastics industry does not go short of the new steel it needs.

Obsolete machines and equipment, redundant buildings, in fact everything containing iron and steel which has outlived its effective purpose — all this is scrap and should be sent off to your local scrap merchant as soon as possible.

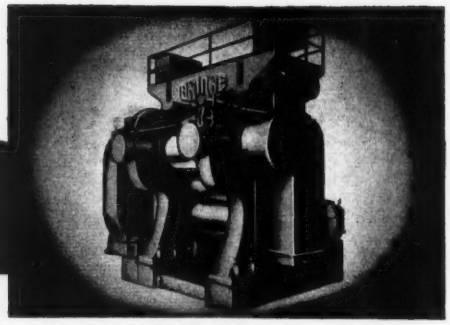
Search your works for it and turn it in. You will be doing yourselves a great service.

VISIT STAND NO. A.35

at the British Plastics Exhibition, Olympia, June 8-18 — and see what STEEL is doing to help the national effort.

Issued for the STEEL SCRAP DRIVE by the
British Iron and Steel Federation and the National Federation of Scrap Iron, Steel and Metal Merchants.

SPEEDICUT
FIRTH BROWN TOOLS LTD
SPEEDICUT WORKS · CARLISLE ST. EAST · SHEFFIELD 4

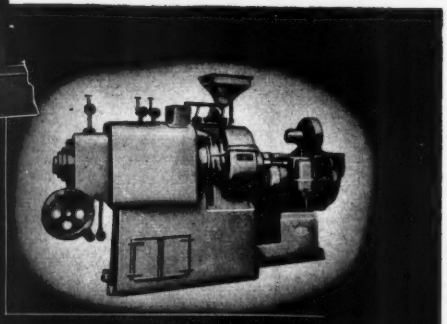


Precision Calender with three superimposed and one offset roller. Flood lubrication.

The Hallmark

of DESIGN, SERVICE and PERFORMANCE *in* **RUBBER AND PLASTICS MACHINERY**

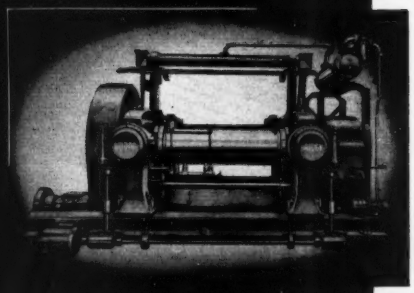
The Bridge — Banbury Patent Mixer. (1)

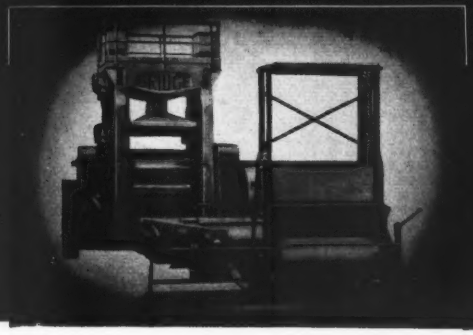


4½" Cold Feed Plastics Extruder. (3)

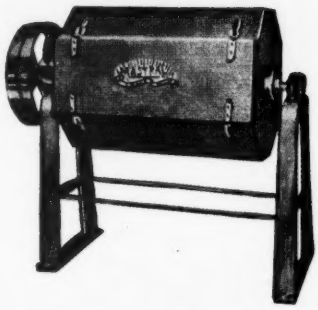
Precision Calender with four superimposed rollers. Flood lubrication. (2)

High temperature 22" x 60 Plastics Mill with flood lubrication. (4)



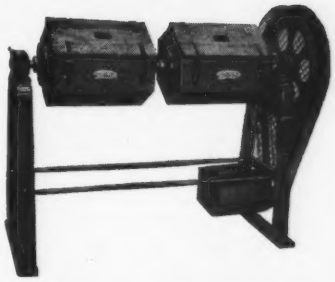


MASTRAL
PLATING AND POLISHING EQUIPMENT REGD.

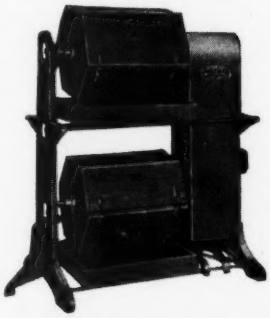


BELT DRIVEN

MOTORISED

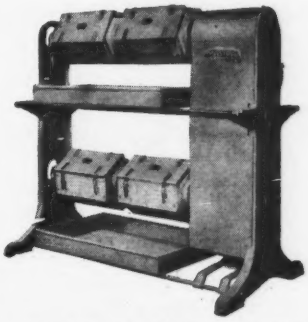


TWIN BARRELS

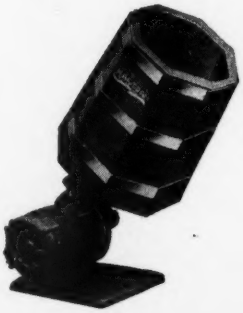


DOUBLE MASTRAL

BARRELS
STEEL
RUBBER LINED
WOOD
PLASTIC
LAMINATED WOOD
Write for our Barrel Booklet

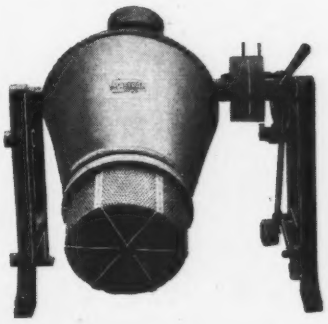


FOUR-BARREL UNIT



MASTRAL TUMBLER
(BENCH MODEL)

CENTRIFUGAL DRYER



SAWDUST DRYER

THE KINGSLAND ENGINEERING CO. LTD.
25-37 HACKNEY ROAD . LONDON . E.2. *Telephone:* SHOREDITCH 5635.

Big Pellets fast

Patent applied for in Great Britain and many other countries.

PELLETMASTER ABRIDGED SPECIFICATION	
Overall dimensions	41 x 13 x 18 high
Weight	16 cwt.
Diameter of pellet	1¼ in. up to 2½ in.
Approximate weight for 1 in. diameter pellet	1·3 oz. - 2·8 oz.
Approximate number of pellets per hour	1000
Operating pressure	35 tons.

The advantages of hydraulic pelleting combined with the speed of a mechanical pelleter—that is BIPEL's contribution to the job of making sound moulding preforms—and moving them quickly.

How it is done? By using the main ram for compressing the powder only: filling and ejecting carried on rapid movements of the die and hopper.

In hydraulic pelleting powder is compressed not by a blow as in a mechanical pelleter, but by a steady pressure which can be maintained for exactly as long as it takes to compact the powder. In the BIPEL pelleter both the 'Dwell' and the pressure can be accurately adjusted in a few seconds to suit the powder being pelleted. This in itself is an important advantage. But there are others, for example:

(1) No moving parts come between the punches, so the machine cannot suffer damage.

(2) There is no powder spillage because filling takes place in the hopper.

(3) The ram is free of eccentric stresses so that the action is equivalent to applied pressure in hand operation. Full green consistent density.

(4) Features that could be possible on machine tools mechanical operation can often be achieved on the BIPEL, because of the length of stroke and accuracy of response.

(5) Adjustment of pellet weight is very simple, and can be made while the machine is running.

The machine is completely self-contained with its own motor and pump (shop air supply is used for the controls). Since pressure only exists up during the pressing and ejection, the motor is running light most of the time. Power consumption is remarkably small and maintenance charges are more than more reasons why it pays to . . .

INVEST IN BIPEL HYDRAULIC MOULDING

B.I.P. ENGINEERING LTD., SILVERDALE ROAD, STREETLY, STAFFS.

B·I·P GROUP

How BIPEL does it

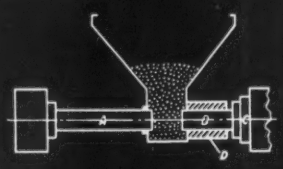


Fig. 1. Shows the fill position, the gap between the punches being in the lower part of the hopper.

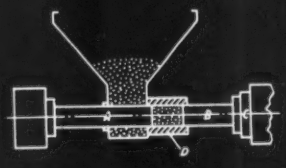


Fig. 2. Shows the die and hopper moved to the left, the gap between the punches (full of powder) being in the die.

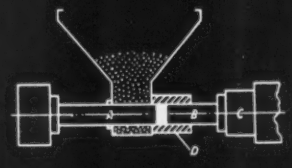


Fig. 3. Shows the pellet being made. The ram 'C' has moved forward carrying the moving punch 'B' with it and compressing the powder in the die.

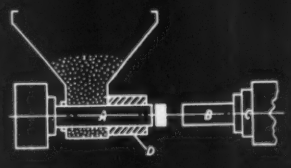


Fig. 4. Shows the die and hopper moved to the extreme left and the pellet ejected (ram 'C' moving back at the same time). The next operation is travel of the die and hopper to the extreme right for the next powder fill.

R.H.C. PRODUCTS

THE SYMBOL OF SERVICE

A Most Comprehensive Range of Raw Materials for the Plastics Industry

As Specialists of long standing in raw materials for Plastics we feel the time has come to list briefly our range of products. The range, always comprehensive, has increased recently to a remarkable extent in pace with the latest technical developments.

STYRON 475 SHEETING	For forming by conventional methods.	**RHC POLYSTYRENE MOULDING GRANULES**	For injection and compression moulding and extrusion.
STYRON **666 General Purpose** **777 Medium Impact** **475 High Impact** **700 Heat Resistant** **637 Light Stabilised**	For injection and compression moulding and extrusion.	**ADHESIVES**	For Plastics.
		STYRENE MONOMER	Glass clear, light stable. Heat sensitive. For Polymerisation in the manufacture of plastics, laminating and sealing compounds, co-polymers, etc.
CELLULOSE ACETATE MOULDING POWDER	In a range of colours for injection moulding.	**CELLULOSE ACETATE FLAKE**	For the manufacture of moulding powders, lacquers, strippers, foils and sheeting.
METHYL METHACRYLATE POLYMERS & MONOMER	Glass clear, light stable inert. For surface coatings and dental purposes.	**POLYAMIDE MOULDING COMPOUNDS**	For injection and extrusion.
		POLYURETHANE MOULDING COMPOUNDS	For extrusion and injection for articles having high mechanical qualities.
VINYL CHLORIDE POLYMERS AND CO-POLYMERS	Compounds for calendering, injection and extrusion.		
CELLULOSE ACETATE BUTYRATE MOULDING COMPOUNDS	Iniection and extrusion.	**ACETO BUTYRATE FOIL (ELECTRICAL INSULATING)**	For cable and wire wrapping. Insulating.
		POLYESTER RESINS (COLD SETTING AND HEAT HARDENING TYPES)	For impregnating glass fabrics, potted circuits, etc.
TRIFLUORO-MONO-CHLORO ETHYLENE (Fluorinated high Polymer Hydrocarbons)	Moulded goods. For high electrical properties, chemical resistance, etc.	**TOMLINITE LIGNIN POWDER**	Colour: dark brown. Reinforcing agent filler-extender for Phenolic resins, laminates, etc.
POLYALCOHOLS AND ISOCYANATES	Cross linked light density products. For expanded plastics acoustic and thermo-electrical applications.	**PHENOL FORMALDEHYDE THERMOSETTING RESINS**	For laminating, bonding and foundry work.
		THERMOCHROM CRAYONS (TEMPERATURE INDICATORS)	Temperature indicators for machinery heating systems, etc. Rapid and distinct colour change.
PHENOL FORMALDEHYDE & UREA FORMALDEHYDE THERMOSETTING MOULDING COMPOUNDS	For compression and transfer moulding.	**THERMOCOLOUR POWDERS**	Uses as above. Soluble in industrial methylated spirit.

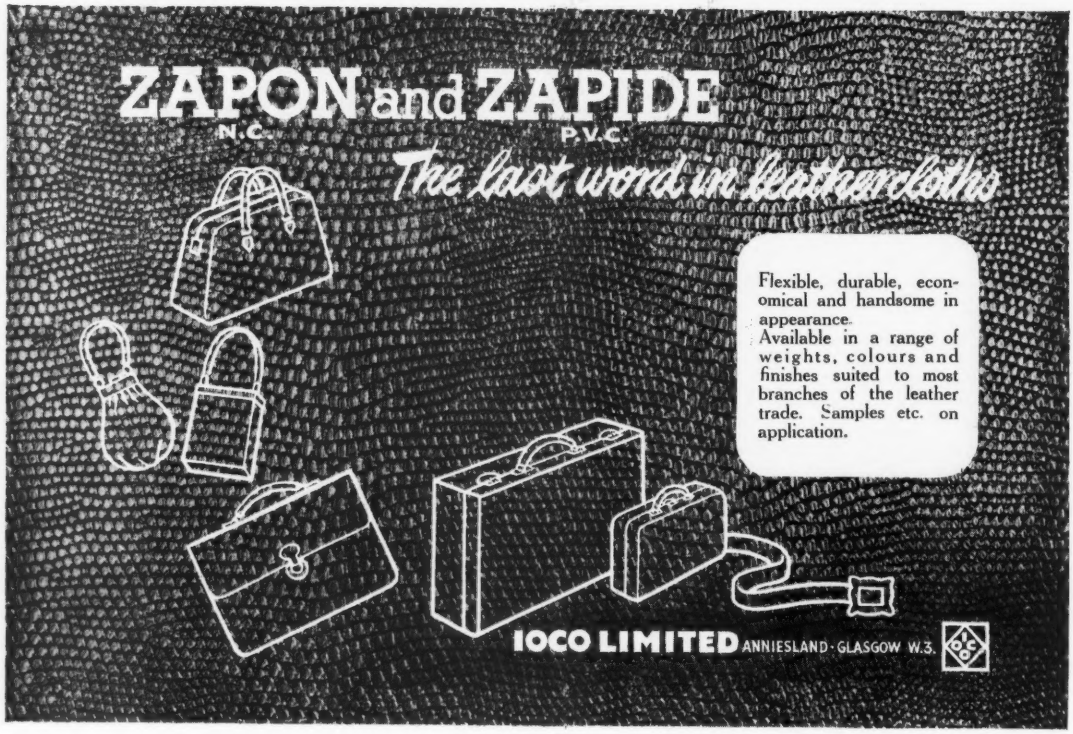
TRADE GRINDING SERVICE. Complete modern equipment, particularly adapted for the requirements of the Plastics Industry. At your service, for all GRINDING, CRUSHING, PULVERISING and MAGNETIC SEPARATION.

In addition to our own manufacturing activities we are Concessionaires for sixteen manufacturers of highest repute at home and abroad, thus, in effect, all products are supplied by us at FIRST HAND.

R. H. COLE & COMPANY LTD

2 CAXTON STREET · WESTMINSTER · LONDON · SW1

Telephone: ABBey 3061 (10 lines) Telegrams: GERATOLE, PHONE, LONDON

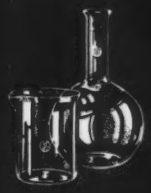

ZAPON and ZAPIDE
N.C. P.V.C.
The last word in leathercloths
Flexible, durable, economical and handsome in appearance.
Available in a range of weights, colours and finishes suited to most branches of the leather trade. Samples etc. on application.
IOCO LIMITED ANNIESLAND · GLASGOW W.3.

P.I.V.
POSITIVE AND INFINITELY VARIABLE GEARS
An infinite variation of speed up to a range of 6-1
PLUS HIGH EFFICIENCY, long life and low running costs make the P.I.V. gear just the answer to your own particular gearing problem.
Other features include patent chain and wheel faces ensuring a NON SLIP drive and adjustment of gear ratio whilst running under load.
We can supply a large range of types and sizes and will forward our catalogue on request.
STONE-WALLWORK LTD
32 VICTORIA STREET LONDON S.W.1 PHONE ABBEY 4461-2
MEMBERS OF THE J. STONE GROUP

'PYREX'

Regd. Trade Mark BRAND

Laboratory and Scientific Glassware



'PYREX' Brand Laboratory and Scientific Glassware is made *only* by James A. Jobling & Co. Ltd., the original and the largest manufacturers of heat-resisting Glass in the United Kingdom.

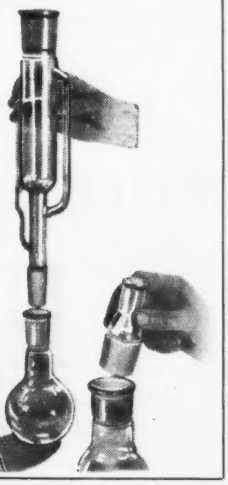
All such glassware fabricated from 'PYREX' Glass in Sunderland carries the 'PYREX' trade mark indicated below, as a guarantee that it is Jobling-made throughout.

When ordering, kindly insist on 'PYREX,' the first name in heat-resistant glass. If you have any difficulty in obtaining your 'PYREX' supplies, please write to the sole manufacturers at Wear Glass Works, Sunderland.

'PYREX' Brand Ground Glass Joints — Standard — Interchangeable

They ensure perfect fit, and freedom from leaks. Standard adaptors make possible smooth interchange between vessel and vessel. In addition, the robust walling of the tubing is a protection against fracture from actual physical shock or rapid exchange of temperature. These characteristics make 'PYREX' Glassware distinctly safer, thus leading to greater economy in usage.

Send for complete booklet of 'PYREX' Laboratory and Scientific apparatus, using your trade notepaper, or attaching your professional card.



BRITISH INSTRUMENT INDUSTRIES EXHIBITION
OLYMPIA-LONDON
JUN.30-JUL.11'53
STAND Nº B 5

Special Apparatus

We can fabricate glassware to your own design, made to serve your specific purposes, and we welcome your enquiries.

MADE IN PYREX ENGLAND REGD. TRADE MARK

JAMES A. JOBLING & CO. LTD.

Wear Glass Works Sunderland

The original and only makers of 'PYREX' Brand Glass in the United Kingdom

MADE IN PYREX ENGLAND REGD. TRADE MARK

for

PLASTICS MACHINERY OF ALL TYPES

Including:

Two-roll Mixing Mills • Pre-form Tabletting Machines • Hydraulic Compression and Injection Moulding Presses • Extruders Pumps and Accumulators • Vulcanising Pans.

WOOD LANE, LONDON, W.12
'Phone: Shepherds Bush 2070. 'Grams: Omniplant, Telex, London
STANNINGLEY, Near LEEDS
'Phone: Pudsey 2241. 'Grams: Coborn, Leeds

GEORGE THE 600 GROUP OF COMPANIES **COHEN**
SONS AND COMPANY LIMITED
Established 1834

And at Kingsbury (Nr. Tamworth) · Manchester · Glasgow · Morriston, Swansea · Newcastle · Belfast · Sheffield · Southampton · Bath

F/5212/HP37(Z)

The BEST Laminating Resins are . . .

FERGUSON'S

NESTOR BRAND

Cresol 50% Water Solution . . . . . Z.470.
For impregnation and rapid cure.

Cresol 50% Spirit Solution . . . . . Z.439.
For coating and high electrical.

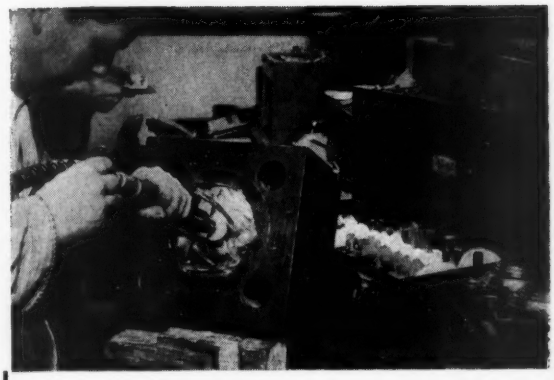
Cresol Solid Resin . . . . . Z.400.
Soluble in spirit for coating and high electrical.

Send your enquiries to—

James Ferguson & Sons Limited
Lea Park Works, Prince George's Road, Merton Abbey
London, S.W.19

TEL.: MITCHAM 2283/7
Grams.: Nestorius, Souphone, London

See our other announcement on page 21



Flextol
POWER DRIVEN HAND TOOLS
Regd. Trade Mark

N.G.F. 250 EQUIPMENT for the Toolroom

This equipment is ideal for making and maintaining jigs, dies, press tools, moulds, etc. It comprises a .45 h.p. Universal motor with built-in 2-speed gear, giving speeds of 10,700 and 1,500 r.p.m., flexible shaft and ball-bearing handpiece to take any of the 62 tools contained in the type T.C. 250 Tool Case. The standard equipment includes profile grinding wheels, rotary files, wire brushes, felt bobs, polishing mops, and arbors for each.

Illustrated folder on application.

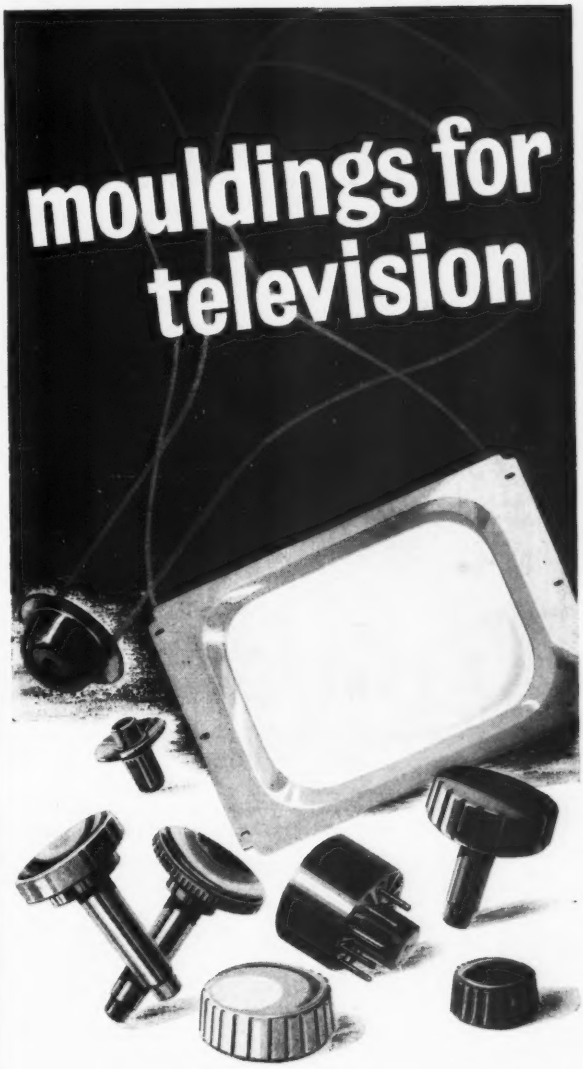
FLEXTOL ENGINEERING COMPANY LIMITED

Head Office and Works:
THE GREEN, EALING, LONDON, W.5
Telephone: EALING 6444/5/6/7

Midland Area: W. H. Simpson, Hillside Avenue, Mapperley, Nottingham. Phone: Arnold 68273
Northern Area: J. H. Bogg, 19 Howard Road, Northenden, Manchester. Phone: Wythenshaw 3061
Western Area: T. Sheppard, 17 Stradbrook Avenue, Kingsway, Bristol 5.
Scotland Area: G. K. Baillie, 66 Craiglockhart Road, Edinburgh 11. Phone: Edinburgh 88345

95-91

mouldings for television



THERE are many points in a television or radio receiver where fine mouldings can enhance efficiency . . . appearance . . . and simplify assembly. KENT MOULDINGS are organised to produce a wide range of well-finished components such as C.R. tube masks, backs, knobs of various designs, tube end protectors, etc.

KM

KENT MOULDINGS

Makers of high-precision mouldings

KENT MOULDINGS, FOOTSCRAY, SIDCUP, KENT

Telephone: FOOtscray 3333

Coronation Invitation

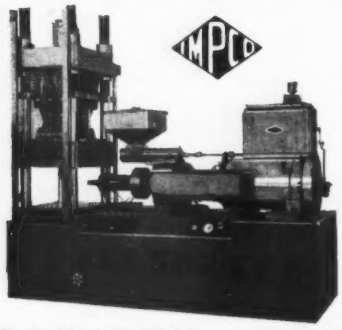
Our London showrooms in Conduit Street, in the heart of Coronation land, will be open during Coronation week. Any of our friends who are in London are most cordially invited to call. Come at your convenience or make an appointment by letter or by 'phoning LARkswood 5511.

BX PLASTICS LIMITED **9 Conduit Street, W.1.**

FINNEY **HYDRAULICS**

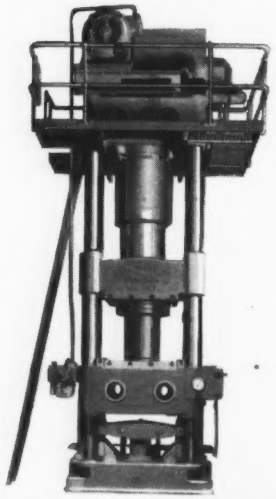
A NEW TECHNIQUE IN INJECTION AND TRANSFER MOULDING

A 500-ton Downstroking Press for clamping and 100-ton Upstroking Transfer Ram which may be used to give additional pressure to eliminate shrinkages or flow marks. Used to shear gates, pierce or engrave under part of moulding, or to eject. The horizontal injection on it is of conventional type and may be supplied with interchangeable cylinders. Also with nylon moulding equipment. Capacities from 8-32 ounces. With preplasticiser up to 100 ounces. The Perfect Machine for use with Metal inserts.



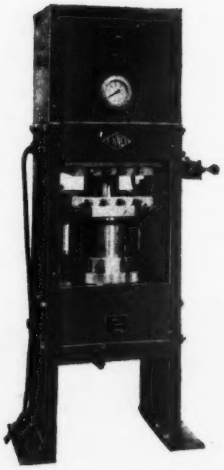
600/800 TONS DOWNSTROKING SELF-CONTAINED COMPRESSION MOULDING PRESSES

With 36" square patent electric hotplates 21" stroke, 40" daylight. 55-ton ejector unit and 75-ton push-back cylinder. Working pressure 4,300 p.s.i.



HOBBING PRESSES FOR IMPROVED TOOL MAKING

Compact, space-saving design. From 200-1,000 tons. Ample daylight and bolster area. Fabricated in high-tensile steel. Completely self-contained.



Everything for the Plastics Trade

FINNEY PRESSES LIMITED

BERKLEY STREET, BIRMINGHAM Phone: MID 3795/6 Cable: FINHYD, B'HAM

T·X·P

TRIXYLENYL PHOSPHATE

T·X·P *is a good plasticizer for polyvinyl chloride, cellulose nitrate and other polymers.*

It is **WATER WHITE,** *free from odour and has a very low volatility.*

Polyvinyl chloride plasticized with **T·X·P** *has excellent flame-resisting qualities.*

ALBRIGHT & WILSON LTD

49 PARK LANE · LONDON · W·1 · *Tel:* GROsvenor 1311 · *Works* OLDBURY & WIDNES

TXW65

Control Knobs

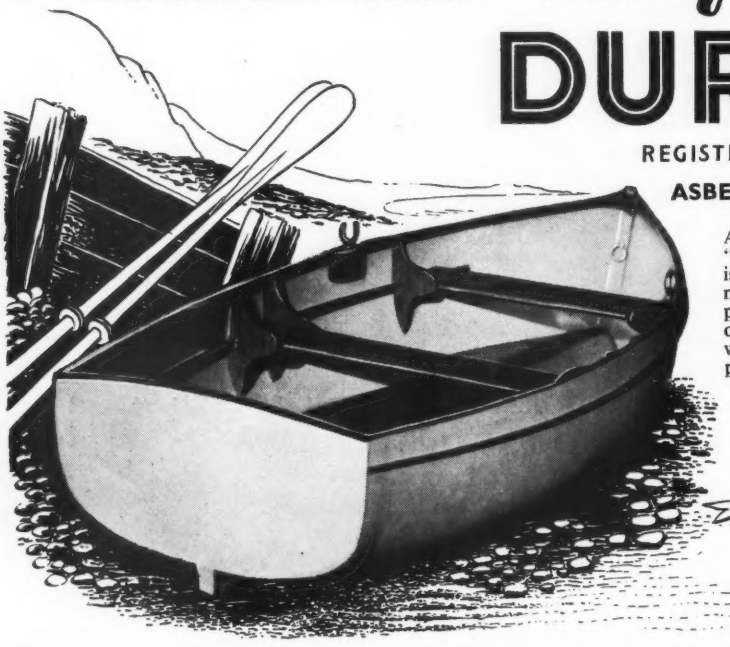
MOULDS AND MOULDINGS by CASE DEVELOPMENT CO., LTD.
KANGLEY BRIDGE RD. SYDENHAM S.E.26.

Another new use for

DURESTOS

REGISTERED TRADE MARK

ASBESTOS FELT MOULDING MATERIAL



A further example of the versatility of "Durestos" Asbestos Felt Moulding Material is this dinghy, produced by a simple heating method of moulding, there being no applied pressure. The felts in pliable form were laid up on a mould to the shape of the dinghy and the whole subjected to heat. The boat was then painted and the wooden fittings inserted.

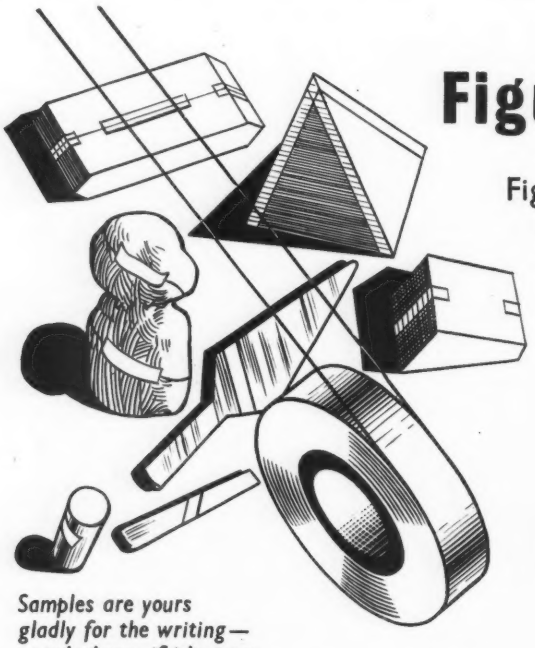
Photograph by courtesy of The Southampton Launch & Boat Co. Ltd.

STRONG
LIGHT
TOUGH

TURNER BROTHERS ASBESTOS CO. LTD., ROCHDALE, ENGLAND

A MEMBER OF THE TURNER & NEWALL ORGANISATION

AF 14



Figures in tape

Figures mean something when you reflect upon the savings in time and money they represent. To say nothing of improved product presentation, the preservation of quality, the prevention of pilfer

Symmetrical or Grotesque

transotape

copes copiously!

Samples are yours gladly for the writing— or telephone, if it's more convenient—Shepherds Bush 3326, asking for "Transotape Sales", please.

A.I.D. Approved

Gosheron can TAPE it!

JOHN GOSHERON & CO LTD GAYFORD ROAD LONDON W12

DURAWIRES DURACABLES

Accurately extruded P.V.C. Insulation

A wide range of standard Wires and Cables, and special designs for exceptional requirements

Also

DURASTRIP

Extruded plastic strip in various colours and designs for ladies' and gentlemen's belts, etc.

Sole Manufacturers:

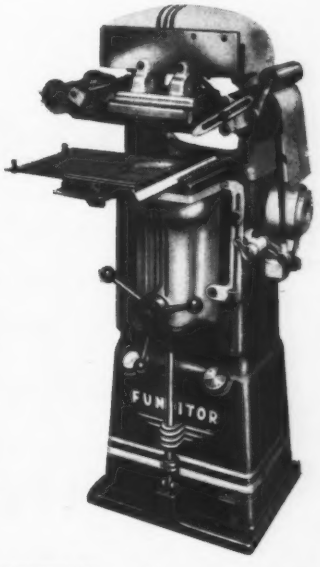
Duratube & Wire Ltd

FELTHAM Telephones: Feltham 3453-6 **MIDDLESEX**

MARKING

a good job—it's FUNDITOR!

The distinctive red of lipstick catches the eye—whether on the cheek of an errant husband or enhancing the lips of a captivating woman. Distinctive colour marking, or blocking, can also give the final eye-catching appeal to plastic parts. For colour blocking designs, graduations, letters, numerals, codes, etc., into plastics the easy efficiency of Funditor Blocking Presses ensures permanent distinction.



Using the Pneumatic Blocking Press illustrated takes the effort out of colour blocking plastics. Areas up to 12" × 10" are colour marked quickly and easily. Positive pressure and Automatic Temperature Control ensure that the finished marking is clear-cut and consistent.

SEND FOR TECHNICAL LITERATURE

Funditor Ltd

3 WOODBRIDGE ST, LONDON EC1

Telephone: CLErkenwell 6155/7

Tyler SPIRAL BLADES

MARVEL 7" BAND SAW

The round blades are revolutionary and with their 360 deg. cutting edge, saw intricate work smoothly and easily. Spiral blades are tough and flexible. They are essential equipment for manufacturers of plastic articles.

Cut in any direction

without turning the work

METAL-PLASTIC-WOOD

These amazing blades are incorporated in the compact sturdily made Tyler Marvel which is equipped with built-in ¼ h.p. single phase Hoover motor with integral switch, mounted on belt tensioning base. Flat and spiral blades and guides provided. The entire weight is only 65 lbs. 8 ozs. Saw speeds—200, 400 and 750 feet per minute. £33 complete (including Flat and Spiral Blades and Guides). Write today for machine dimensions and details of how the "Marvel" can be most useful to you. Saws wood, metal and plastic *in any direction.*

SPIRAL SAWS LTD TRADING ESTATE, SLOUGH, BUCKS, Telephone : Slough 20013

NYMOL
Registered Trade Mark

Nylon produced precision engineering components

★ **Certain engineering requirements can best be met by Nylon. Our knowledge, derived from specialised experience, is freely available to engineering designers.**

Plastic Engineers Limited

TREFOREST, GLAMORGAN

Telephones : Taffs Well 271–272

PE.2

-when the discussion turns to a moulding

remember ---

J.F. KENURE

BRITISH PLASTICS EXHIBITION OLYMPIA

JUNE 8th - 18th.

You are invited to inspect our range of mouldings and materials on

STAND No. A42.

MOULDINGS in all thermoplastic materials up to 10 oz., including FLEXIBLE MOULDING by the patented KENUTUF (P.V.C.) Process.

★

TOOL DESIGN and PRECISION MOULD MAKING. FULLY EQUIPPED MODERN TOOL ROOM. Capacity and facilities for FABRICATION, MANIPULATION AND ASSEMBLY OF PLASTIC AND METAL COMPONENTS.

J. F. KENURE, LTD., FELTHAM, MIDDLESEX

Telephone: FELTHAM 2604/5/6

DRM

DURHAM CHEMICALS PRODUCED AT BIRTLEY, COUNTY DURHAM

P.V.C. STABILISERS

Metal Stearates,
Laurates, Ricinoleates,
Lead Silicate

Branch Offices:

1 Booth St., Albert Sq.,	Neville Hall, Westgate Rd.,	166 Buchanan Street,
MANCHESTER, 2	NEWCASTLE-ON-TYNE, 1	GLASGOW, C.1
Deansgate 5581	*Newcastle 21261*	*Douglas 2561*

Head Office:

DURHAM RAW MATERIALS LTD, 1/4 GT TOWER ST, LONDON, EC.3 · MANsion Ho: 4333

ORGANO-TIN COMPOUNDS,

widely acclaimed as a distinct advance in the stabilizing of Vinyl plastics, are now made in the United Kingdom by PURE CHEMICALS LIMITED of Kirkby Trading Estate, Liverpool.

For full technical details, write or telephone to **PURE CHEMICALS LTD.**

LONDON OFFICE: 89 UPPER THAMES STREET, LONDON, E.C.4. MANSION HOUSE 4533

83292

As leading specialists in this field our technical staff welcome enquiries for all types of extruded plastics. We can promise you also keen personal service and a completely satisfactory product. Extrusions are our business—not just a department.

C. & C. MARSHALL LTD.
PLASTRIP HOUSE,
OAKLEIGH ROAD NORTH, LONDON, N.20
Telephone: Hillside 5041 (3 lines) Cables: Tufflex, London
Telegrams: Tufflex, Norfinch, London

TUFFLEX

suppliers of the finest

reprocessed
Polyethylene

with guaranteed electrical properties

POLYTHENE LTD., 100 Jermyn St., London, S.W.1
Tel.: WHItehall 3978
Grams: Lebathene, Piccy Cables: Lebathene London

Stand C618

(ELECTRICAL GROUP)

B.I.F.

Castle Bromwich

The latest developments in

ELECTRICAL INSULATING COMPONENTS

•

E. H. T. BUSHINGS

•

ARC CONTROL POTS

Laminates for

General Engineering uses Silent Gears and Colliery Plant Accessories.

•

Overhead Line fittings.

•

S.R.B.P Tubes.

PERMALI LIMITED

Gloucester · England

Telephone 24941

Pioneer Plastic House

NOTED FOR TECHNICAL ACCURACY AND DELIVERY. OVER 40 YEARS' EXPERIENCE. WE POSSESS A WELL EQUIPPED TOOL ROOM AND DEAL WITH REALLY DIFFICULT SUBJECTS.

Address enquiries to

MOULDING DEPARTMENT

TURNING AND MACHINING DEPARTMENT

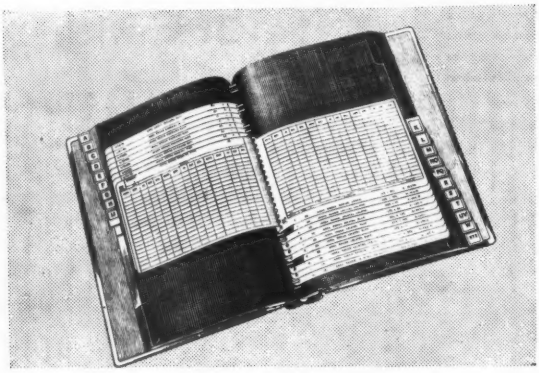
W. H. TANT & CO. LTD.

DOLLMAN STREET, BIRMINGHAM, 7

Phone: ASTon Cross 3232

ENGINEERS!

A New Production Record To Control — VISIBLY — Plastic Output



A number of new visible records have recently been designed to help production and administration in the field of Plastics.

These cover a variety of purposes and meet almost every need in this field.

Take, for instance, a new "Shop Achievement" record as a typical example of how such records give visual control of output—plus a substantial saving in time and clerical labour.

This record details the daily and weekly output of components, rejects, customer's order number, shop or code number, delivery dates, shipments, inspection releases, etc., etc.

A few dozen or thousands of such records can be compactly housed in panels or books so that any single one is VISIBLE for instantaneous check of progress—thus saving time on reference and clerical entry. The responsible executive can control any and every operation and component—thus speeding up output and securing flexibility.

Machine maintenance and machine loading records, plus pattern and drawing records, are also available.

Full details of such existing records — plus facilities for designing others specially to your needs—are freely available. Just write "Engineering Records" on your letterheading and full details will be sent by return.

Shannon Systems

FIRST IN FILING

The Shannon Ltd.

997 Shannon Corner - New Malden - Surrey

NATIONAL COLLEGE OF RUBBER TECHNOLOGY

Northern Polytechnic, Holloway,
London, N.7

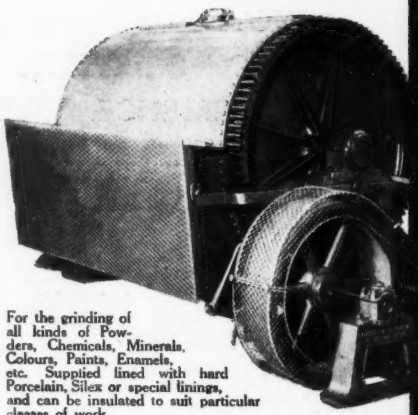
Applications are invited for Scholarships which provide annual grants for fees and maintenance to enable students to undertake courses at the National College of Rubber Technology. Scholarships are normally tenable for three years. Graduates, however, may apply for Scholarships tenable for one year or more for post-graduate study, followed by research. Applicants must have attained the age of 18 years by 31st August, 1953, be British subjects ordinarily resident in the United Kingdom and have obtained the standard of education required for admission to the courses.

Full details and form of application, to be returned not later than 10 June, 1953, will be sent on request.

R. H. CURRELL
Clerk

STEEL-SHAW

PEBBLE MILLS



For the grinding of all kinds of Powders, Chemicals, Minerals, Colours, Paints, Enamels, etc. Supplied lined with hard Porcelain, Silex or special linings, and can be insulated to suit particular classes of work.

Send for our free illustrated literature

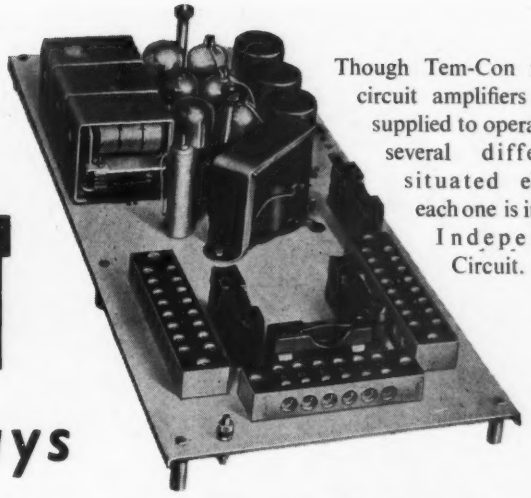
STEELE & COWLISHAW, LTD.,
Engineers (Dept. No. 97)
Head Office and Works:
COOPER STREET, HANLEY, STOKE-ON-TRENT
Telephone: Stoke-on-Trent 2109
London Office: 329, High Holborn, W.C.
Telephone: Holborn 6023

Nearly ½ a Century's Experience in Grinding

Low in cost..
High in efficiency

TEM-CON

Electronic Relays



Though Tem-Con multiple circuit amplifiers can be supplied to operate from several differently situated elements, each one is in fact an Independent Circuit.

Made by the originators of TEM-CON Electronic Temperature Control Systems

The system adopted in the construction of the TEM-CON Relay and Amplifier, is such as to permit when required the substitution of other types of standard R.C. boxes, thus allowing considerable variations in the operations of the Units. Operating current: 60 micro amps. at up to 1 volt. Unaffected by voltages in primary leads, however long. Switching currents up to 8 amps. at 200/250 v. A.C. Available instantaneous, or with fixed or variable delay, to switch off with making or breaking primary contact, or with single pole change-over switching. In the case of the multi-circuit amplifier, terminal boards and fuses are supplied as inclusive items. No Thyratrons or thermally operated switches are employed. Supplied in strong, stove enamelled, metal cases. Available in units of from 2 to 5 circuits. Size 2/3 circuit :— 8.19/32" x 16⅜" x 4.13/16" high; 4/5 circuit :—8.19/32" x 19⅜" x 4.13/16" high ; single phase :—4½" x 4" x 1¼".

For full details of the TEM-CON relay to suit your particular needs write to :

P.A.M. LTD.

Merrow · Guildford · Surrey
Telephone : Guildford 2211

Moulds by Experts.

Injection Mould for 10½" Sleeping Doll with movable head, arms and legs.
Material — STYRENE.

Specialists in
MOULDS
FOR PLASTICS

★H.B.SALE LTD.

PROGRESS WORKS, SUMMER LANE, BIRMINGHAM, 19

Established 80 years. TEL.: CEN 5661/3 GRAMS.: SALE, B'HAM Member of G.T.M.A.

BRITISH INSTRUMENT INDUSTRIES EXHIBITION
Stand No. 147

Send for LIST No. 250

ETHER-WHEELCO
ELECTRONIC CONTROLS

The Ether-Wheelco "Capacitrol" Electronically Operated Temperature Controller provides reliable and accurate control for Injection Moulding Machine nozzles and platens. The instrument operates instantly, and gives far closer temperature control than any other type of Controller on the market. The use of thousands of these instruments for this purpose has proved their accuracy and reliability all over the world.

ETHER LTD. TYBURN RD., ERDINGTON, BIRMINGHAM, 24
TELEPHONE: EAST 0278-7

Holdens

ELMATIC
HEATING ELEMENTS
FOR THE PLASTIC INDUSTRY

MICA INSULATED BAND HEATERS *(Single Units or Hinged)* AND STRIP HEATERS, CERAMIC INSULATED STRIP HEATERS, CARTRIDGE HEATERS AND TUBULAR HEATERS

THE NEW
ELMATIC CERAMIC INSULATED BAND HEATERS
Made as single units, or in two semi-circular forms for clamping. Specially designed for heavy industrial use and long reliable service.

PERKINS & SEWARD LIMITED
HEAD OFFICE: 56, ST. MARY STREET, CARDIFF
TELEPHONE: CARDIFF 45623
London Agents: ELPROD LTD., 189 WARDOUR ST., W.1. Tel.: GERrard 7685

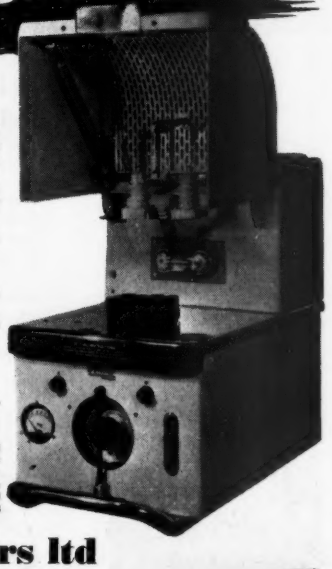
MELPLAS

Extruded Plastics
Rigid—and Flexible

Whatever the requirements in Extruded Plastics "Melwoods" will make them promptly, economically and to the best ability of the finest workmanship and up-to-date machinery.

MELWOOD THERMOPLASTICS LIMITED
WILLOUGHBY ROAD · HARPENDEN · HERTS
Telephone : Harpenden 300 *Telegrams : Melplas Harpenden*

50% SAVING IN PRODUCTION TIME



Production can often be doubled with RADYNE Pre-heaters without extending your factory or installing more presses.

- ★ The 500W RADYNE H5/A will fully plasticise up to 6 oz. of powder per minute.
- ★ Small presses can mould large parts.
- ★ Pin breakages eliminated.
- ★ No difficulty with very heavy mouldings.
- ★ Reduced electricity consumption per moulding.
- ★ Tool costs halved.
- ★ Better surface finish.

Send today for illustrated literature.

RADYNE

radio heaters ltd
WOKINGHAM
BERKS · ENGLAND

OUR NEW WASTE PAPER BALING PRESS

has been designed to meet a demand of long standing for an inexpensive but well-constructed and strongly made Press, suitable for the average business.

It helps—

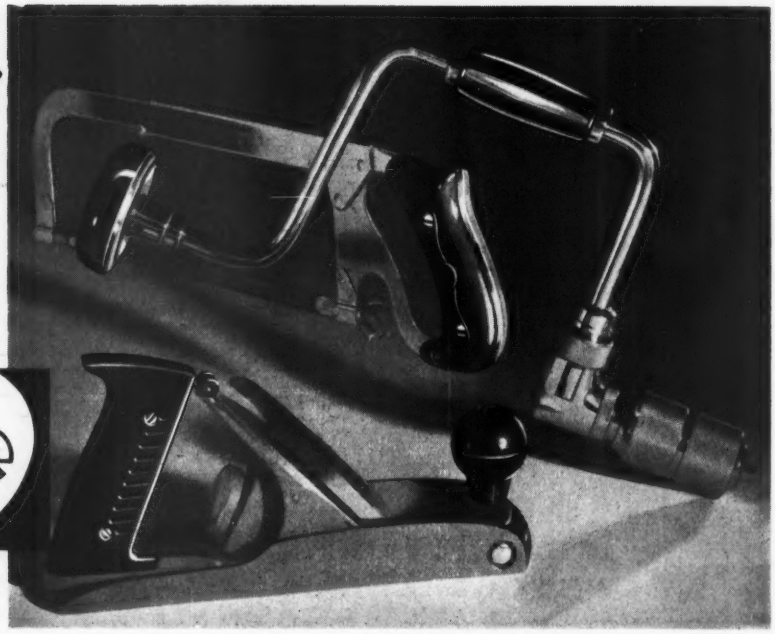
1. To keep your Premises clean and tidy.
2. To save Storage Space.
3. To increase the value of Waste.
4. To reduce the danger of Fire.
5. To prevent the contents of your Paper-baskets passing into unauthorised hands.

Full details from the manufacturers.

TYNE TRUCK & TROLLEY CO. LTD.
First Avenue, Team Valley Estate, GATESHEAD-ON-TYNE, 11
Telephone: Low Fell 77104 and 77105

Another job well handled

Manufacturers of tool handles need a material that is tough, durable, dimensionally stable, resistant to flame, perspiration, grease and grime, and pleasant to the touch.
Their choice is—



Tenite PLASTICS

- Can be injection moulded at very high speeds.
- Well suited to continuous extrusion without the use of solvents.
- An unlimited range of colours in transparent, translucent, opaque and variegated forms.

Write for technical data, literature and moulding samples to T.E.C. Products Division

KODAK LIMITED

WEALDSTONE, HARROW, MIDDLESEX. Tel: Harrow 4380, Ext. 26.

'TENITE' IS A REGISTERED TRADE-MARK

AJAX

Air Turbine

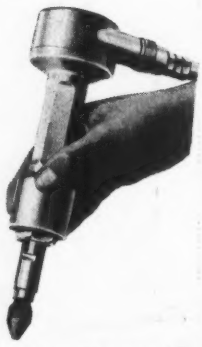
HAND GRINDERS FOR YOUR MOULDS

AJAX JUNIOR

Weighs only 8 oz. Speed approx. 90 000 R.P.M. For Grindstones $\frac{1}{16}$" to $\frac{3}{8}$" dia. Sturdy Spindle. Collet bored for $\frac{1}{8}$" dia. shanks. Air Pressure required 50-100 lbs./sq. in.

Leaflets P2 and P3 on request.

Please state Air Pressure when ordering



AJAX II and AJAX III

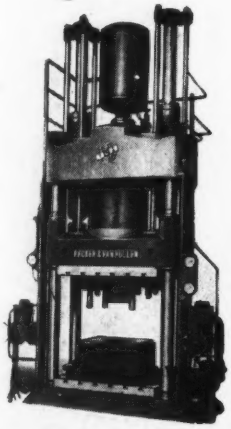
Powerful, yet easily handled. Speed approx. 50 000 R.P.M. For Grindstones $\frac{3}{8}$" to $\frac{3}{4}$" dia. Collet bored for 6 mm. or $\frac{1}{4}$" dia. shanks. Air Pressure required 50-100 lbs./sq. in.

BRIGGS BROS. & CO.,
Ajax Works, Jakeman Rd.,
Birmingham 12
Phone CALTHORPE 2141

BECKER & VAN HÜLLEN

Compression Transfer and large injection moulding **PRESSES** and moulding tools

NOW AVAILABLE AGAIN IN GREAT BRITAIN . . . .

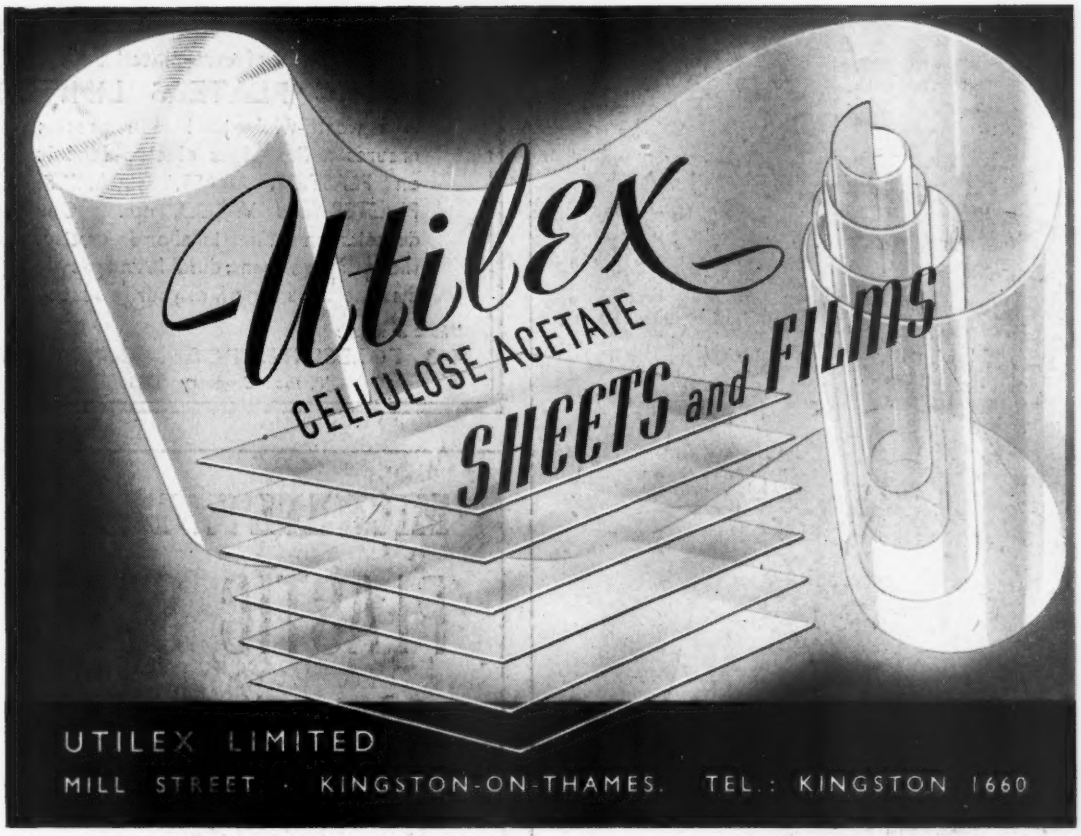


There are many Becker and van Hüllen presses and complete plants, installed before the war, still giving outstanding service in this country. Becker and van Hüllen presses, incorporating the very latest ideas in design, are now available here again and your enquiries are invited.

SOLE AGENTS
ARPAL

ARPAL (ENGINEERS) LIMITED

ABFORD HOUSE, WILTON RD., LONDON S.W.1. Tel.: VICtoria 2785, 4880, 0783



If you require a . . .

VACUUM COATING SERVICE

consult V.M.C. Ltd.

METALLIZATION OF PLASTIC MOULDINGS FOR DECORATION PURPOSES

V.M.C. Ltd. 54 ALDERTON ROAD, CROYDON, SURREY
ADDiscombe 1157

CONSULT THE ADHESIVES DIVISION

OF

EVODE

STAFFORD

Evo-stik S.H. 12 is the one-part cement now officially recommended by Thomas De La Rue for their 'Formica' Cut Panel Scheme.
Available to the Industrial user in quarts and gallons from the usual Formica Distributors it is rapidly finding favour as the best adhesive for on site work.
Enquire at your local merchants or write for Instruction Leaflet 101 to

EVODE LIMITED, STAFFORD
Telephone: 1590-1-2. Telegrams: Evode, Stafford

Why Peerless Mixers?

Whether on pilot or production work, "Peerless" mixers offer big advantages in the way of four speeds, easy cleaning, and quick, simple exchange of beater. They can be fitted with Venner Time Switches if required. Their mechanical precision makes them ideal for emulsions, pastes, cellular foams and mixes of all consistencies. Bowls are of pressed steel, triple tinned, or stainless steel, aluminium or nickel and can be supplied with draining tap and pouring lip. For moving heavy mixes, bowl trolleys are available. Write for details of "Peerless" Mixers for all chemical and industrial applications.

PEERLESS

PEERLESS & ERICSSON
6 Lygon Place, Grosvenor Gardens, London, S.W.1
Telephone : SLOane 7291

TA5318

PLASTICS **electro-plated** by
CERAMIC PLATERS LIMITED
is a worth-while job ! Our process ensures a **first-class electro-deposit** on PLASTICS, GLASS, CERAMICS, PLASTER and WOOD, etc. Our deposits can be functional or decorative, they are permanent, durable and greatly increase the strength of your products.
'Phone or write :
443 FOLESHILL ROAD, COVENTRY
'Phone : Coventry 88563

MICHAEL S. STEVENS
PLASTIC SCRAP
Buyers at Your Works of
Injection Scrap, Scrap Cuttings
KESWICK WORKS, KESWICK RD., PUTNEY, S.W.15
VANdyke 3345

BYSON
FOR
BAKELITE
Acetate and other Synthetic Mouldings. Modern Plant and Facilities.
APPLIANCE CO. LTD.,
WOOLFOLD, BURY, LANCS.
Telephone : Bury 1560-1. Telegrams : "Bysonite, Bury."

W. B. COLDWELL & SONS LTD.
DIESINKERS,
MOULDS,
JIGS.
89-91, ROCKINGHAM LANE,
SHEFFIELD, 1.
TELEPHONE : SHEFFIELD 24047.
DIPLOMA FOR DIE SINKING 1911

MODEL S.45/RG

OTHER MODELS AVAILABLE UP TO 3½" SCREW

EXTRUDERS
BY
REIFENHÄUSER

FOR ALL EXTRUDABLE PLASTICS

To Make

Profiles, Filamens, Rigid and Flexible Tubes

Covered Wire, Cable, Rope, etc.

Sheets and Foils by the Blowing System

etc., etc.

Sole British Agents

ED. BRAND LTD.

9 ST. CROSS STREET, HATTON GARDEN, LONDON, E.C.1

Telephone: CHAncery 4091 (3 lines) Telegrams: Wyrellous, London

Est. 1900

TRADE EMPIRITE MARK

Empire Plastics (BIRMINGHAM) Ltd

EMPIRE WORKS
BRUETON STREET
BIRMINGHAM · 4
Phone: ASTon Cross 2451

PLASTIC MOULDINGS FOR THE TRADE

LONDON & SCANDINAVIAN METALLURGICAL CO LIMITED

Injection moulds for small and intricate articles

Sole manufacturers of hard nickel electroformed cavities

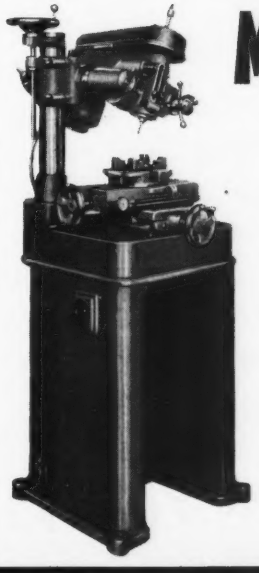
MOULD SHELLS FOR FLASHLESS SLUSH CASTINGS

CHELTON WORKS, GONSALVA ROAD, LONDON, S.W.8. MACaulay 5575

ANDERLE

VERTICAL MOULD MILLING MACHINE

TYPE VFF.



A sturdy and extremely versatile Universal Machine ideally suited to the economical production of moulds for the Plastics Industry.

Working Surface of Table ..... 16½" × 6¼".
Max. distance Table to Spindle..... 8".
Spindle Speeds .....(7) .....380—3,900 R.P.M.
Morse Taper ..... 2.
Power ..... 0.75 H.P.

Please ask us to arrange a demonstration.

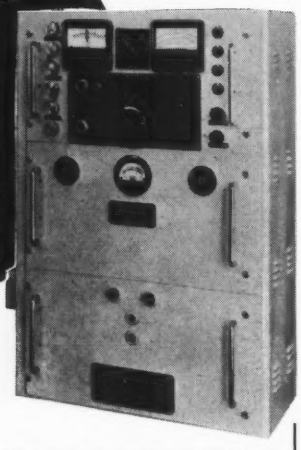
IMMEDIATE DELIVERY

ELGAR *Machine Tool Company Limited*

HAMPTON ROAD WEST · HANWORTH · FELTHAM · MIDDLESEX

Phone: FELTHAM 4266 Cables & Grams: SHIPMENTS FELTHAM

THICKNESS MEASUREMENT by Atomic Energy



BALDWIN "ATOMAT" BETA RAY THICKNESS GAUGE for continuous measurement in PLASTICS PRODUCTION

The thickness and the deviation from a pre-set thickness are both indicated and there is no contact with the material.

Write for Leaflet L.124

BALDWIN INSTRUMENT CO. LTD.

DARTFORD :: *Tel.: 2989 & 2980* :: KENT

Cellulose Acetate Plastics

By Vivian Stannett

THIS IS THE First Book to be entirely devoted to a thorough technical survey of the properties and potentialities of this well-known thermo-plastic. It is designed to be of equal interest and value to the business man and the engineer or chemist, and includes a chapter on packaging and container applications.

Illustrated, 30s. net, by post 30s. 8d.

TEMPLE PRESS LIMITED

BOWLING GREEN LANE, LONDON, E.C.1

Please write for full list of books published in association with "Plastics."

For PLASTIC MOULDINGS

LINKING

QUALITY WITH SERVICE

CONSULT

SOUPLEX LTD.

WESTGATE · MORECAMBE · TELEPHONE 1717

Hobbing can Save you Money on Moulds

consult us to see if we can hob your mould cavities. Expensive time spent on die-sinking can often be avoided.

First-class Service & Delivery

L. WHITING LTD.

HOBBERS TO THE TRADE

296, Latimer Rd., North Kensington, W.10. *Ladbroke 3521*

JOHN CASTLE & Co. Ltd.

STOCKISTS of Perspex Sheets, Virgin and Reground Cellulose Acetate, Polythene and Polystyrene Moulding Powders.

POLYTHENE, Polystyrene, Acetate and Perspex. We are sellers and buyers of these materials in any form.

GRANULATION plant available for reprocessing Acetate, Polystyrene, Polythene, and other Thermoplastic scrap. Materials ground to customers requirements.

All enquiries to:—

JOHN CASTLE & Co. Ltd.

5 HURLEY ROAD, LONDON, S.E.11

Telephone: RELiance 4274/5

M. CALDERON LTD.

SPECIALISTS IN

THE MANUFACTURE OF

HEATING ELEMENTS

FOR THE

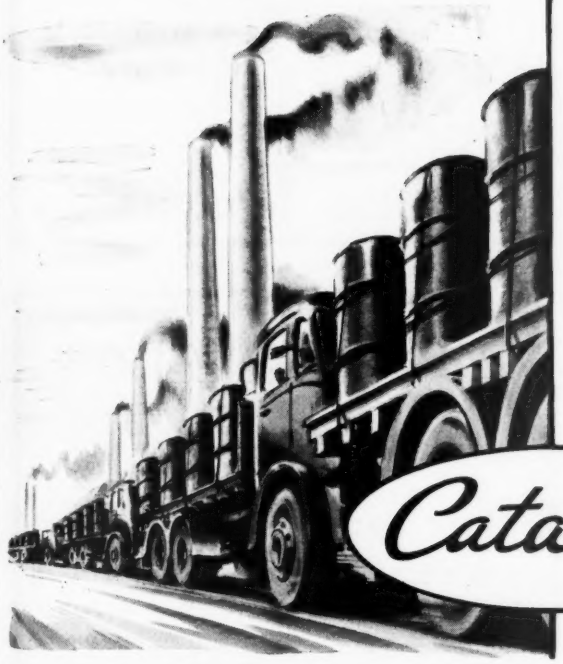
PLASTICS MOULDING INDUSTRY

ALL ENQUIRIES TO HEAD OFFICE:

227 UPPER STREET,

LONDON, N.1 **CAN. 4696**

Catabond polyester resins *available in any quantity*



- ECONOMICAL
- SIMPLE TO HANDLE
- HOT, WARM OR COLD SETTING

for CONTACT RESINS *contact*

CATALIN LIMITED
WALTHAM ABBEY, ESSEX
Manufacturers of Industrial and Cast resins
Telephone : Waltham Cross 3344

Catalin

PLASTIC MOULDINGS

to your requirements

FREDERICK W. EVANS LTD.
PLASTIC WORKS, LONG ACRE, BIRMINGHAM, 7.
Tel: EAST 1286 (2 Lines)

M.C.M.
(TOOLS) LTD.

Designers and Toolmakers
for Compression, Transfer and Injection Moulds, Pressure Die Casting Tools, Jigs and Fixtures
Let us solve your difficulties

M.C.M. (Tools) LTD. 12, Denmark Street, Aston
BIRMINGHAM, 19 *Aston Cross 1878*

From stock

★

Acetate sheeting
"Bexoid"
"Crinothene"
"Perspex"
"Rilfoil"
P.V.C. sheeting
Lampshade Parchment
"Mistic" adhesive in Plastic tubes
Papers for Plastics

★

SPICERS LIMITED

(Plastics Department)

19 New Bridge Street, London, E.C.4. Tel: CENtral 4211

SESSIONS PATENTED SELF-ADHESIVE LABELS

STICK TIGHT ON SMOOTH AND DIFFICULT SURFACES

Supplied with Dispensers for Quick Handling

Sole Licensees in the U.K. of the American inventor of the "KUM-KLEEN" Label:

WILLIAM SESSIONS LTD., YORK, ENGLAND

CHARLIE COIN *for*

LAMINATED PLASTICS
BAKELITE
EBONITE · FIBRE

Non-Metallic Gears · Racks
Machined Components
Insulating Segments

CONSULT THE SPECIALISTS:
COIN INSULATION LTD.
COIN WORKS, COURTENAY RD., WOKING, SURREY
Telephone: Woking 275

PIONEERS
IN
MOULDS
for MODERN PLASTICS
also
PRESS TOOLS, JIGS & GAUGES
BARBER & DUFFY LTD.
214/222 CARDIGAN ROAD · LEEDS
Phone: Leeds 52033

REPETITION in
Casein, Ebonite
Bakelite, Etc.
MANSELL
TEMPLE STREET :: RUGBY

FIRE!
WHICH COLOUR
NU-SWIFT?
Red, blue or black? Distinctive colours for different fire risks prevent costly errors. Are your extinguishers the right colours? Write, or phone Elland 2852, for free advice.
NU-SWIFT LTD. · ELLAND · YORKS
In Every Ship of the Royal Navy

Are You Buying
B.L.C.
(EXPORTS) LIMITED
HANOVER BUILDING
35/39 MADDOX STREET
LONDON W.1
TELEGRAMS PHONE BALACA GRO 5717

HOME AND EXPORT
the **RIGHT** *Quality at the* **RIGHT** *Price?*
for **ALL THERMOPLASTICS**
CELLULOSE ACETATE · BUTYRATE
POLYSTYRENE · P.V.C., etc., etc.

Leonex

RUBBER IMPROVEMENT LIMITED

PLASTIC PRODUCTS

Compounds	P.V.C. and Acetate Compounds for all purposes.
Flexible P.V.C. Sheeting	**Rilene** Fine P.V.C. Sheeting, plain, printed and embossed.
	Rilon Heavy embossed unsupported P.V.C. sheeting.
	Rilotank Heavy P.V.C. Sheeting for the chemical industry.
	Rilpol Pressed Polished Sheets, plain, printed and with lace inserted.
Semi Rigid P.V.C. Sheeting	**Rilfoil** for the making of Lampshades and for decorative purposes.
Rigid P.V.C. Sheeting	**Rilplate** for signs, displays, fascias, letters and all decorative purposes.
Extrusions	Flexible and rigid sections for all trades.
Plastic Flooring	**Durever** Plastic Flooring in tiles and sheets for all purposes.

Head Office and Works :
RILEX WORKS, LONDON ROAD, WELLINGBOROUGH, NORTHAMPTONSHIRE
Telephone : Wellingborough 2218
Northern Area Office : 22 Upper Camp Street, Broughton, Salford, 7. *Telephone : Broughton* 1549

WANTED
STOCKS FOR CASH

WE are cash buyers of merchandise of every description. Also Clearance Stocks, Discontinued Lines, Surplus Stocks, **Bottles, Jars, Screw Caps, Cartons and other Packaging Materials**; in fact, goods of all kinds can be disposed of through us, without delay, on the most favourable terms, and without trouble.

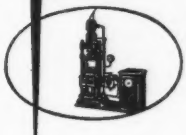
SHOULD you have anything for disposal, either now or at any future time, please send us samples, full particulars and price on a cash settlement basis.

RELIANCE TRADING COMPANY
13, New College Parade, Finchley Road, London, N.W.3
TELEPHONE: PRIMROSE 3167 AND 5611

IPL

MATERIALS
Phenol and Urea Powders. Cellulose Acetate. P.V.C. Polystyrene, Polyethylene.

MOULDS
Injection and Compression Moulds. Jigs and tools for metal components.



MACHINES
Injection and Compression Presses. Grinders. Finishing Equipment. *Sole distributors of the Girovinyle Cube Dicer.*

COMPLETE SERVICE TO MOULDERS

IPL

INDUSTRIAL PLASTICS LIMITED
London and Export Office:
Piccadilly House, 16-17 Jermyn Street, London, S.W.1
Telephone: Grosvenor 2848/9 *Cables:* Ipla London

TELCOMATIC INSERTS

TELCO LTD. 3 Newman St. W.1 Tel. MUS 5701

Classified Advertisements

PRESS DAY.—June issue—1st post Tuesday, May 26. Last-minute additions and alterations accepted by telephone from trade advertisers up until noon.

RATES.—4d. per word (minimum 12 words 4/-). Each paragraph charged separately and name and address must be paid for. Semi-displayed setting 35/- per single column inch. Series discounts of 5% for 6, and 10% for 12 consecutive insertions allowed to trade advertisers.

TERMS.—Strictly net and prepayable. Monthly accounts for settlement by the end of the month following insertion are allowed to trade advertisers if satisfactory references are provided.

REMITTANCES.—Cheques and postal orders should be crossed and made payable to TEMPLE PRESS LIMITED and instructions sent addressed to the Manager, "Plastics," Bowling Green Lane, London, E.C.1.

THE PROPRIETORS retain the right to refuse or withdraw advertisements at their discretion and are not responsible for clerical or printers' errors although every care is taken to avoid mistakes.

BOX NUMBERS.—Private advertisers desiring to have replies sent care of "Plastics" may do so on payment of 1/- to cover booking and postage, plus cost of four extra words. To avoid mistakes in forwarding, Box Numbers should be carefully and legibly copied and replies sent to Box P000, care of "Plastics," Bowling Green Lane London, E.C.1.

DEPOSIT SYSTEM facilities are available to readers to purchase advertised goods through "Plastics." Commission 1% (minimum 2/-) on amount deposited.

HEAD OFFICES: Bowling Green Lane, London, E.C.1, England. Telephone: Terminus 3636. Telegrams: "Pressimus, Phone, London."

BRANCH OFFICES: 5, Suffolk Street, Birmingham, 1. Telephone: Midland 4117-8. 50, Hertford Street, Coventry. Telephone: Coventry 62464. 1, Brazennose Street, Manchester. Telephone: Blackfriars 5038-9. 12, Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

AGENCIES

ESTABLISHED SALES TECHNICIAN requires agencies for products of interest to the plastics industry in the Midlands. Full-time position considered. Box P903, care of "Plastics." 190-x2683

AUCTIONEERS' ANNOUNCEMENTS

HOWARD AND MANNING,
F.A.L.P.A.,
218 THE BROADWAY,
WEST HENDON,
LONDON, N.W.9.
Hendon 7686-8.
AUCTIONEERS AND VALUERS
to the plastic trade. zzz-446

MACHINERY, TOOLS AND PLANT

ALTERNATORS. Diesel sets, electric motors, switch gear, transmission equipment, fluorescent lighting and industrial fittings ex stock, keen prices. Contact G. L. Murphy, Ltd., Menston, near Leeds. zzz-210

HYDRAULIC. Frazer Mono-radial pumps, new and second-hand, in stock. Thompson and Son (Millwall), Ltd., Cuba St., London, E.14. East 1844. zzz-440

B.T.H. POWERFUL MOTORIZED DUST EXTRACTION UNIT, also ideal for blow-cooling, £15, one third cost. Bellangers, 306 Holloway Rd., London, N.7. North 4117. 190-3387

PLATENS. Electric- and steam-heated strip elements, thermostats, etc., and safety guards for hydraulic presses. Frederick Ellis (Engineers), Ltd., 60 Hatcham Rd., London, S.E.15. New Cross 1396. 191-3428

FOR SALE, Masseeley Model 21 hot press printing machine, Markmaster printing machine with guillotine, and Aqua Plus heating machine. Particulars, Box P8921, care of "Plastics." 190-x1136

PLASTICS MACHINERY.
Hydraulic Presses of all sizes. Injection Machines. Extruders, Mixing Mills, Hydraulic Pumps and Accumulators.
Send your inquiries to the specialists.
REED BROTHERS (ENGINEERING), LTD.,
REPLANT WORKS.
CUBA STREET, MILLWALL, E.14.
Phone, East 4081 (five lines). zzz-335

ONE WINDSOR RC65 twin-screw extruding machine for sale, new 1951, first offer £1,250 secures. Chiltern Paper Products, Ltd., Belswains Lane, Nash Mills, Hemel Hempstead. 190-14

MANESTY NO. 2a TABLET COMPRESSING MACHINE, new and practically unused. Box P8915, care of "Plastics," or Mitcham 3471, ext. 32. 190-28

TABLETTING MACHINES.
Automatic single punch machine by Bradley and Turton, Model E2, for tablets up to 1¾ in. dia. by ½ in., rate 35 per min., pressure 30 tons.

Vertical machine by Duncan Stewart for tablets up to 2¾ in. dia., punch stroke 3 in., ejector stroke 1⅝ in. fitted adjustable ejector gear to give variable filling depth up to 1⅜ in., approx. 30 strokes per min., including feed hopper and 5 h.p. motor, 400-3-50.

Courtoy single punch machine for tablets up to 2¼ in. dia., punch stroke 3¼ in., ejector stroke 1½ in., filling depth adjustable up to 1½ in., approx. 35 tablets per min.

Single punch machine by Wilkinson, adjustable stroke up to 1¼ in. filling depth up to ½ in., fitted feed hopper suitable for tablets up to 9/16 in. dia., output 140 per min.

George Cohen, Sons, and Co., Ltd., Wood Lane, London, W.12. Phone, Shepherd's Bush 2070 and Stanningley, nr. Leeds. Phone, Pudsey 2241. 190-1

Machinery, Tools and Plant (contd.)

PLASTIC MOULDING PRESSES.
400-ton upstroke press by Greenwood and Batley, 16-in. dia. ram by 28-in. stroke. Four columns 20½ in. by 17⅜ in. between. Table area 36 in. by 17½ in. Daylight 3 ft. 5 in. W.P. 2-tons sq. in.

250-ton upstroke press by Henry Berry, 15-in. dia. fescolised and glanded ram by 20-in. stroke. Four columns 23½ in. by 11½ in. between. Table area 23½ in. by 22 in. Fitted pair of 8-in. dia. side pullback rams. Daylight 20-in. W.P. 1½-tons sq. in.

200-ton downstroke plastic moulding press by Hydraulic Eng. Co. D.A. piston type ram 11-in. dia. by 9¾-in. rod by 12-in. stroke. Table area 30 in. by 21 in. Daylight 28 in. Transfer ram below fixed table. D.A. piston type ram 6⅜-in. by 6¼-in. rod by 8-in. stroke, and pair of ejector rams 2-in. dia. by 1⅝-in. rod by 7½-in. stroke. Self-contained pumping unit, supply tank, etc. New 1948.

150-ton transfer moulding press by Bradley and Turton, transfer load adjustable 40-28-tons, closing ram 12-in. dia. by 12-in. stroke. Return load by two side pushback rams 10 tons. Transfer ram 8-in. dia., stroke adjustable 4-6 in. Daylight 22 in. W.P. 2,240-lb. sq. in.

40-ton upstroke press by Tangye, 14-in. dia. ram by 21-in. stroke. Four columns 18½ in. by 18½ in. between. Table area 2 ft. by 18 in. Daylight adjustable 16-20 in. W.P. one tone sq. in.

Two 120-ton downstroke presses by Hydraulic Eng. Co. D.A. piston type ram 8¾-in. dia. by 7⅝-in. dia. rod by 14-in. stroke. Table area 24 in. by 21 in. Ejector grid fitted below fixed table and ejector ram. D.A. piston type 3-in. dia. by 2⅝-in. rod by 4½-in. stroke. Self-contained pumping unit, supply tank, control valves, etc.

80-ton downstroke press by Finney, 10½-in. dia. ram by 15-in. stroke with two 2-in. dia. pushback rams. Four columns 21 in. by 10 in. between. Table area 18½ in. by 18 in. Daylight 24 in. Fitted pre-fil tank and valve. W.P. one ton sq. in. New 1948.

75-ton downstroke press by T. H. and J. Daniels. 8-in. dia ram by 12-in. stroke. Two side pullback rams. Four columns 23 in. by 16 in. between. Table area 36 in. by 23 in. W.P. 1½-tons sq. in.

Three 65-ton downstroke presses by Rice, 9-in. dia. ram by 10-in. stroke with single 4½-in. dia. overhead pullback ram. Four columns 13 in. by 13 in. between. Table area 21 in. by 13 in. W.P. 1-ton sq. in. Daylight adjustable 18-22 in.

50-75-ton downstroke press. 8-in. dia. main ram and two 2½-in. dia. side pushback rams by 14-in. stroke. Four columns 21¼ in. by 9¼ in. between Table area 20½ in. by 17⅛ in. Daylight 23 in. Pre-fil tank and valve also hand operated bottom ejector gear. W.P. 1-1½-tons sq. in.

50-ton "Coborn" enclosed downstroke plastic moulding press, main ram 12-in. dia. by 10-in. stroke, arranged for pre-filling with two side pushback rams fitted with pair of electric platens 17 in. by 17 in. Daylight 19¾ in. Self-contained pumping unit and motor, control valve, etc.

Two 40-ton upstroke presses by Hollings and Guest, 6-in. dia. ram by 10½-in. stroke. Four columns 14 in. by 16 in. between. Table 14 in. by 11⅞ in. Daylight 16 in. W.P. 1½-tons sq. in.

George Cohen Sons and Co., Ltd., Wood Lane, London, W.12. Phone, Shepherd's Bush 2070 and Stanningley near Leeds. Phone, Pudsey 2241. 190-2

MACHINERY, TOOLS AND PLANT WANTED

WANTED TO BUY, new or second-hand moulds for injection moulding ball pen and fountain pen cases. Box P8619, care of "Plastics." 191-3286

COMPRESSION MOULDING TOOL wanted. Send details of your surplus, obsolete and redundant moulding tools. Box P8811, care of "Plastics." 190-3391

WANTED, 1 oz. or 2 oz. Hupfield injection moulding machine, must be recent model in 100% condition. Moulds also considered. Send details to Box P908, care of "Plastics." 190-12

SIZE 2A OR 3A. Banbury required for use in Australia, a machine needing repairs will be considered. Box P9017, care of "Plastics." 190-25

PATENTS

THE OWNERS OF PATENT NO. 632,645, which concerns "Process for Preparing Moulding Powder," is desirous of arranging by way of licence or otherwise, on reasonable terms, for the commercial development in Great Britain of this invention. For particulars address Elkington and Fife, 329 High Holborn, London, W.C.1. 190-26

PRINTING AND DUPLICATING

2½d. FOR SAMPLES. Rogers and Company, 7 St. Andrew's Crescent, Cardiff. Phone 28165. 192-447

PRODUCTION CAPACITY

PLASTICS (MANCHESTER), LTD.,
BRITAIN'S LEADING STOCKISTS AND DISTRIBUTORS.
SPECIALISTS IN
FABRICATION, INJECTION MOULDING AND ENGRAVING.
11 WHITWORTH STREET,
MANCHESTER, 1.
Central 7081-2 and Central 1000. zzz-0316

REPETITION MACHINING, Casein, Catalin, brass, etc. 110 Mile End Rd., E.1. 190-3244

INJECTION MOULDING IN POLYSTYRENE AND ACETATE, ETC. Capacity available on modern mass-production plant up to 8 oz. Can use your moulds or produce moulds in our first-class toolroom. We have extensive and long experience in production of industrial, fancy goods and toys. Plasticast Developments, Ltd., Princess St., Peterborough. 195-3208

INJECTION MOULDING by I.O.G. Industries, Ltd., 41 Marshgate Lane, Stratford, E.15. Maryland 2804. 196-3243

INJECTION MOULDING CAPACITY available up to 3 oz. Precision moulding a speciality. Guardian Plastics, 56 Bermondsey St., London, S.E.1. 197-3287

REPETITION in Ebonite, Erinoid, etc. Capstan lathe work. Mansell, Temple St., Rugby. 197-3288

SMALL INJECTION moulding capacity and up to 3-oz. available at keen rates. Box P866, care of "Plastics." zzz-449

DINES PRODUCTS, Stanley Rd., Grays, Essex, for injection mouldings. 192-3329

BELEY MICA PLASTIC CO. for injection moulding. Tools if required. Phone, Leytonstone 2639, or call 252-6 L.M.S. Railway Approach, High Rd., Leytonstone, E.11. zzz-450

SHORT RUNS A SPECIALITY: LONG RUNS A PLEASURE. Low mould costs and overheads. Injection capacity and technical knowledge at your service. Westminster Plastics, 367 High St. North, London, E.12. Grangewood 3777. 199-3388

PLASTIC WELDING CAPACITY available. H.F. electrodes manufactured. Polyweld Plastic Co., Colliston Passage, Colliston Rd., Merton Rd., S.W.18. Putney 0706. 190-x2680

Production Capacity (contd.)

CAPACITY AVAILABLE for manufacture of compression and injection moulds to customers' own designs. Modern plant and equipment. Inquiries for same will receive prompt attention. Box P9024, care of " Plastics." 191-1006

TO TOY MANUFACTURERS AND OTHERS. Send us your inquiries for mass production of clockwork mechanisms and sheet-metal components complete, including tooling and assembly. Centre lathe and capstan work. Small orders appreciated. Large orders even more so. Phone, Advance 2962. Stamford Metallics, Ltd., 2-4 Peary Place, Roman Rd., London, E.2. 190-30

PRECISION ENGINEERS AND TOOLMAKERS have capacity available on two Taylor Taylor Hobson, Three Dimensional Pantograph machines. Inquiries invited. Box P9023. 191-1005

MODERN PLASTICS, LTD.,
FOR
PLASTIC MOULDINGS
OF ALL TYPES.
CAPACITY AVAILABLE.
CORONATION WORKS,
KANGLEY BRIDGE ROAD, LOWER SYDENHAM, S.E.26.
Phone, Syd 5120. 190-23

COMMERCIAL STUDIO has capacity for hand-painting of any description on all types of plastic materials. Very keen prices for large quantities. Toymek Co., Ltd., 59a Portobello Rd., W.11. Park 5762. 192-1004

INJECTION MOULDINGS AND PLASTIC COVERINGS in acetate, alkathene, p.v.c., machined parts in brass, steel and plastics. After 40 years in Birmingham we now have extra capacity at our new factory and solicit your inquiries. F. A. Ketch and Son, Ltd., Trent Valley Works, Lichfield, Staffs. zzz-451

KINGSTON PLASTICS, LTD., Unity Works, Union St., Kingston-on-Thames. Manufacturers of virgin and second-grade cellulose acetate moulding powders, matched to customer's own requirements for colour and flow. Customer's own waste also reprocessed to specified requirements. Sorting and grinding incorporating magnetic separation of metallic particles, of all thermoplastics undertaken. Phone, Kingston 8405. 195-1002

INJECTION MOULDINGS IN THERMOPLASTICS. Moulding in styrene, acrylics and acetate. Design and toolroom facilities available for mould construction. Inquiries invited. J. and E. Courtenay, Ltd., 138 Stratford Rd., Birmingham, 11. 195-1001

MANUFACTURING ARRANGEMENT offered to progressive firm respecting provisional patent inexpensive electrical device, mainly plastic, required in every household, factory, office, etc. Box P905, care of " Plastics." 190-x2682

PRODUCTION CAPACITY WANTED

COMPRESSION MOULDING CAPACITY REQUIRED. Only firms having low overheads and able to quote keen prices for long runs need apply. Moulds supplied. State presses available. Box P9019, care of " Plastics." 191-1003

TOOLMAKING CAPACITY REQUIRED by London firm for compression moulds, press tools, etc. Regular business and prompt payment to small firms having low overheads. Write brief details to Box P9018, care of " Plastics." 191-1008

RAW MATERIAL

DELAFILA, THE INERT FILLER. Used in the manufacture of plastics and insulating and sealing compounds. Prompt supplies in a wide range of finest grades. The Old Delabole Slate Co., Ltd., Delabole, Cornwall. zzz-337

PERSPEX! PERSPEX!! PERSPEX!!! Official stockists for I.C.I. acrylic sheets. Sheets cut to your requirements. Fabrication and mounting specialists to the trade:—
S. C. Errington (Hanwell), Ltd., 132a Uxbridge Rd., Hanwell, London, W.7. Phone, Ealing 5288. zzz-443

ALWAYS LARGE STOCKS OF
CASEIN
RODS, TUBES AND SHEETS.
PERSPEX
SHEETS UP TO 1 in. THICK
CELLULOSE ACETATE
CATALIN RODS
S.R. (PLASTICS), LTD.,
93 ALDERSGATE STREET, E.C.1.
Phone, Monarch 4686. zzz-445

Raw Material (contd.)

A. E. GOODEVE, LTD., offer immediate deliveries of ebonite, casein, laminated Bakelite in rods, sheets and tubes. Also cellulose acetate tubing, clear and coloured. A. E. Goodeve, Ltd., 188a Seven Sisters Rd., N.7. Archway 3654. 199-3389

CLEAR ACRYLIC SEAMLESS TUBES, diameters 15-10 mm. to 60-54 mm. in 2-metre lengths and 2 in. to 6 in. in 5 ft. 6in. lengths or cut sizes; also Perspex, rigid P.V.C. and Astralon sheet. P.D.I., Ltd., 60-64 Livery St., Birmingham, 3. Phone, Cen 5855 and Cen 3735. 191-3427

10 TONS PLASTICIZED NITRO-CELLULOSE (50% nitro-cellulose), good condition, to clear cheaply, £500. Pomson Bulk Buying Co., Ltd., Westminster Ice Rink, Millbank, S.W.1. Euston 5657. 190-27

VINYL SHEETING, 4 mm. Shell, 2 to 3 tons surplus material for disposal. Box P9010, care of " Plastics." 190-5

ACETATE SHEETING for Sale, approximately 2 tons 3mm. clear, 3 tons 5mm. clear, 1 ton 4mm. black, 1 ton 4mm. BX flesh, smoky 60/1000-in. and 40/1000-in. Please inquire, Box P9012, care of " Plastics." 190-6

P.V.C. SCRAP in large quantities continuously for sale. Inquiries invited. Box P9020, care of " Plastics." 190-8

VIRGIN CELLULOSE ACETATE in pillar-box red, approximately 5 tons, also approximately 1 ton each in white and royal blue. Samples on request. Please inquire. Box P9014, care of " Plastics." 190-18

10,000 YARDS 48-in. opaque " Satin " and 30,000 yards translucent-opaque-metallic 54-in. " Damask " design available. Special prices. Apply Box P9013, care of " Plastics." 190-19

CUEX, LTD., can offer all at prices well below current list:—
Polystyrene.
Cellulose acetate.
Polyethylene.
P.V.C.
Polyvinyl butyral.
Perspex and Diakon.
Send now for details.
Cuex, Ltd., 270 Corporation St., Birmingham. Central 5474. 190-29

GRANULATED P.V.C.
12 tons in various grades and colours for disposal. Samples and prices on request.
P.V.C. Resin.
7½ tons I.C.I. grades. Samples and prices on request. Associated Technical Mnfrs, Ltd., Vincent Works, New Islington, Manchester, 4. Col 1371. 191-1007

RAW MATERIAL WANTED

WANTED, Polythene scrap. Write to Box P7416, care of " Plastics." zzz-0322

SCRAP. Offer to:—
Michael S. Stevens, Keswick Works, Putney, S.W.15. Vandyke 3345. 196-3242

PROMPT CASH OFFERED for virgin and reprocessed cellulose acetate and polystyrene. Give manufacturer's name and packing. Box P873, care of " Plastics." zzz-448

ERLANOS, LTD., 93 Aldersgate St., E.C.1 (Monarch 4686) require Perspex and cellulose offcuts and scrap, clear and coloured, highest prices paid. 192-3330

P.V.C. GARMENT AND HANDBAG OFFCUTS wanted. We collect and pay cash. Brockwell Plastics, Ltd., 50 Hollingbourne Rd., S.E.24. zzz-36

AMBER PERSPEX OFFCUTS required in 1/16. Also opal 020 by ⅛ and clear 1/16. Quantities and prices to Box P9016, care of " Plastics." 190-24

WANTED, crinothene and clear or coloured acetate. Surplus stocks bought for cash. Dannell Coward, 7 Earnshaw St., London, W.C.2. Tem 7317. 190-11

SURPLUS STOCKS of thermo-setting moulding powder wanted. Send details Box P864, care of " Plastics." 193-1006

PERSPEX SCRAP and offcuts in 5-ton lots wanted. Please send offer to Box P906, care of " Plastics." 190-3

POLYTHENE SCRAP, natural, also 4mm. acetate sheeting continuously in quantities wanted. Please offer with particulars to Herbert Connor Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 190-10

POLYSTYRENE SCRAP and surplus lots, also clear acetate scrap always in large quantities. Please offer with samples to Herbert Connor, Ltd., 120 Beaufort Park, Falloden Way, London, N.W.11. 190-9

POLYSTYRENE SCRAP and virgin moulding powder any quantities wanted. Please forward details with samples to Box P9015, care of " Plastics." 190-7

CLEAR ACETATE OFFCUTS and scrap in large quantities wanted. Offers with samples and particulars to Box P907, care of " Plastics." 190-4

SITUATIONS VACANT

The engagement of persons answering advertisements in respect of vacant situations must be made through a local office of the Ministry of Labour, or a scheduled employment agency if the applicant is a man between the ages of 18 and 64 inclusive or a woman between the ages of 18 and 59 inclusive, unless he or she, or the employment, is excepted from the provisions of Notification of Vacancies Order, 1952.

MAY AND BAKER, LTD., DAGENHAM, ESSEX, require a qualified chemist for laboratory work relating to the manufacture of plastic films and coatings, experience in the plastic industry is desirable but not essential. The position will be permanent. Contributory pension scheme. Apply initially in writing to the Personnel Officer. 190-20

DEVELOPMENT LABORATORY ASSISTANT wanted for interesting work in the laboratory of a plastics firm. Knowledge of chemistry essential, and some mechanical aptitude would be an advantage. Previous experience in plastics not necessary. Excellent prospects for advancement. Box P9022, care of " Plastics." 190-22

TOOL ROOM FOREMAN required to take complete charge of progressive tool room on south coast employing 30 toolmakers. First essential, must be thoroughly conversant with plastic moulds. Please reply giving full particulars of age, experience and salary to Box P9011, care of " Plastics." 190-16

BYALEX PAPER COMPANY of Swanley, Kent, require agent to sell to aircraft, home appliances and car body manufacturers a new plastic laminate just brought out, on a commission basis. Gentlemen with suitable connections in above industries and with proved selling record should apply. 190-13

SALES REPRESENTATIVE with experience in compression moulding technique required by progressive firm in South East London, connections in trade essential. Salary, commission and expenses. Give particulars of age, qualifications and experience to Box P9025, care of " Plastics." 190-17

SITUATIONS WANTED

ADMINISTRATOR (chemist, chemical-engineer), with outstanding abilities for the organization of production and the leadership of personnel, and possessing an unusually comprehensive technological background plus a fund of commercial acumen, is seeking an opportunity of tackling industrial management problems, preferably, but not necessarily, in fields related to his immediate experience, such as plastics (is P.V.C. expert but not knowledgeable in moulding technique), paints, oils, colours, textiles, paper, starches, etc. A discriminating principal may acquire, on reasonable terms, efficient service based upon some 25 years' successful practice by communicating, in the very strictest confidence with Box P909, care of " Plastics." 190-15

TECHNICAL SALES REPRESENTATIVE, fully experienced all types of synthetic resins, including furniture and foundry trade, including casting resins, age 29, resident London, requires position offering opportunity for advancement; car owner. Box P904, care of " Plastics." 190-x2684

FIRST-CLASS REPRESENTATIVE with many years experience and live connections in the Midlands and North of England is open for engagement with top ranking moulders or manufacturers. Fully conversant with compression and injection moulding, plastic materials and their manufacture. Box P901, care of " Plastics." 190-x1547

PLASTICS ENGINEER, 39, seeks executive post where a thorough practical and theoretical knowledge of mould design, plant and manufacturing methods for thermoplastic and thermosetting materials would be appreciated. Box P902, care of " Plastics." 190-x2681

TIME RECORDERS

FACTORY TIME RECORDERS. Service rental. Phone, Hop 2230. Time Recorder Supply and Maintenance Co., Ltd., 157-158 Borough High St., S.E.1. 197-3289

TRANSFERS

AXON AND HARRISON, supply self-adhesive decorative transfers for plastics. List and samples. Falcon Works, Jersey. 201-1000

MISCELLANEOUS

EXTEND YOUR TRADE.
Use a trade mark. Consult
Trade Mark Protection Society,
12 Church St., Liverpool. 190-2986

PLASTIC TABLE CLOTHS 54 in. by 54 in., 54 in. by 69 in., 54 in. by 84 in., available in ½-colour prints at substantially reduced prices. Apply for samples and details to Box P9021, care of " Plastics." 190-21

MODERN
FACTORY
OF 150,000 SQUARE FEET OR OVER IS
REQUIRED
IN A SOUTH-WEST LONDON AREA FOR ELECTRICAL EQUIPMENT MANUFACTURERS
— EARLY POSSESSION DESIRED —
Details of Freehold or Leasehold premises to
CHAMBERLAIN & WILLOWS
23, MOORGATE, E.C.2 - CITY 6013

TUFFLEX
EXTRUSIONS
are our business . . .
Not just a department
AS the leading specialists in this field our technical staff welcome enquiries for all types of extruded plastics. We can promise you also keen personal service and a completely satisfactory product.
C&C MARSHALL LTD
PLASTRIP HOUSE, OAKLEIGH ROAD NORTH, LONDON, N.20
Telephone : Hillside 5041 (3 lines). Telegrams : Tufflex, Norfinch, London
Cables : Tufflex, London

INDEX TO ADVERTISERS

Name	Page
A	
Albright & Wilson, Ltd.	67
Arpal (Engineers) Ltd.	78
Ashdowns, Ltd.	15
B	
Bakelite, Ltd.	50
Baldwin Instrument Co., Ltd., The	82
Ball, W. W., & Sons, Ltd.	14
Barber & Duffy, Ltd.	84
B.I.P. Engineering, Ltd.	60
Birkby's Ltd.	1
B.L.C. (Exports) Ltd.	84
Blackburn & Oliver, Ltd.	26
Blythe Colour Works Ltd.	Inside Back Cover
Bradley & Turton, Ltd.	3
Brand, Ed.	81
Bridge, David, & Co., Ltd.	58
Briggs Bros. & Co.	78
British Electrical Development Association	16
British Geon, Ltd.	5
British Iron and Steel	56
British Moulded Plastics, Ltd.	52
British Resin Products, Ltd.	41
Bush, W. J.	23
BX Plastics, Ltd.	Inside Front Cover & 66
Byson Appliance Co., Ltd.	80
C	
Calderon, M., Ltd.	82
Case Development Co., Ltd.	67
Castle, John, & Co., Ltd.	82
Catalin Ltd.	83
Ceremic Platers, Ltd.	80
Chamberlain & Willows	88
Chase, Bernard	29
Clifford Covering Co., Ltd.	42
Cohen, George, Sons, & Co., Ltd.	64
Coin Insulation, Ltd.	84
Coldwell, W. B., & Sons, Ltd.	80
Cole, E. K., Ltd.	12
Cole, R. H., & Co., Ltd.	61
Commercial Plastics, Ltd.	8
D	
Dowding & Doll, Ltd.	9
Duratube & Wire, Ltd.	69
Durham Raw Materials, Ltd.	71
E	
East Anglia Plastics, Ltd.	40
Ebonestos Industries Ltd.	25
E.M.B. Ltd.	27
Elgar Machine Tool Co., Ltd.	81
Empire Plastics (Birmingham) Ltd.	81
Erinoid, Ltd.	Back Cover
Ether, Ltd.	76
Evans, Frederick W., Ltd.	83
Evode, Ltd.	79
F	
Ferguson, James, & Sons, Ltd.	21, 64
Finney Presses Ltd.	66
Firth Brown Tools, Ltd.	57
Flextol Engineering Co., Ltd.	65
Foster, Yates & Thom, Ltd.	38, 39
Frazer & Glass, Ltd.	45
Funditor Ltd.	69
G	
Gas Council, The	44
General Electric Co., Ltd., The	4
Gosheron, John, & Co., Ltd.	68
Greenwich Leathercloth Co., Ltd., The	20
H	
Hellerman, Ltd.	36
Hupfield Bros., Ltd.	6
I	
Imperial Chemical Industries, Ltd.	17
Industrial Plastics, Ltd.	85
Injection Moulders, Ltd.	24
Insulators, Ltd.	37
Ioco, Ltd.	62
J	
Jobling, James, A. & Co., Ltd.	63
Johnson, Matthey & Co., Ltd.	54
K	
Kent Mouldings	65
Kenure, J. F., Ltd.	71
Kingsland Engineering Co. Ltd., The	59
Kleestron, Ltd.	31
Kodak, Ltd.	78
L	
Lacrinoid Products, Ltd.	10
Lavino (London), Ltd.	2
London & Scandinavian Metallurgical Co., Ltd.	81
M	
Mansell, G. A.	84
Marshall, C., & C., Ltd.	72, 88
May & Baker, Ltd.	11
M.C.M. (Tools) Ltd.	83
Melwood Thermoplastics Ltd.	77
Micanite & Insulators Co., Ltd., The	Front Cover
Mining & Chemical Products, Ltd.	43
Monsanto Chemicals, Ltd.	34, 35
N	
National College of Rubber Technology	74
Nu-Swift, Ltd.	84
P	
P.A.M., Ltd.	75
Peerless & Ericcson	80
Perkins & Seward, Ltd.	76
Permali, Ltd.	73
Permuta, P. A. (Plastics), Ltd.	7
Plastic Engineers, Ltd.	70
Plastomatic, Ltd.	18
Polythene, Ltd.	72
Projectile & Engineering Co., Ltd., The	49
Pure Chemicals, Ltd.	72
R	
Radio Heaters, Ltd.	77
Reliance Trading Company	85
Resinous Chemicals, Ltd.	28
Rootes Mouldings, Ltd.	53
Rubber Improvements, Ltd.	85
Rue, Thomas De La, & Co., Ltd.	19
S	
Sale, H. B., Ltd.	75
Sessions, W. H., Ltd.	84
Shannon, Co. Ltd., The	74
Shell Chemicals, Ltd.	32
Smith, Stanley, & Co.	48
Souplex, Ltd.	82
Spicers, Ltd.	83
Spirial Saws Ltd.	70
Steele & Cowlishaw, Ltd.	74
Sterling Moulding Materials, Ltd.	46
Stevens, Michael S.	80
Stone-Wallwork, Ltd.	62
Streetly Manufacturing Co., Ltd., The	55
T	
Tant, W. H., & Co., Ltd.	73
Telco, Ltd.	85
Thermo-Plastics, Ltd.	30
Turner Bros. Asbestos Co., Ltd.	68
Tyne Truck & Trolley Co. Ltd.	77
U	
United Ebonite & Lorival, Ltd.	22
Universal Metal Products, Ltd.	47
Universal Tools, Ltd.	76
Utilex, Ltd.	79
V	
Vinyl Products, Ltd.	13
V.M.C., Ltd.	79
W	
Whiting, L., Ltd.	82
Windsor, R. H., Ltd.	33

EDITORIAL AND BUSINESS NOTICES

"PLASTICS" is published on the second Wednesday in each month in London, England, by TEMPLE PRESS LIMITED, and is registered for transmission to Canada and Newfoundland by magazine post.

ADVERTISEMENT AND PUBLISHING OFFICES.—Bowling Green Lane, London, E.C.1, England. Telephone: Terminus 3636. Telegrams: "Pressimus, Phone, London."

EDITORIAL OFFICES.—27, Shaftesbury Avenue, London, W.1. Telephone: Gerrard 4406.

BRANCH OFFICES.—5, Suffolk Street, Birmingham, 1. Telephone: Midland 4117-8. 50, Hertford Street, Coventry. Telephone: Coventry 62464. 1, Brazennose Street, Manchester, 2. Telephone: Blackfriars 5038-9. 12, Renfield Street, Glasgow. Telephone: Glasgow Central 1413.

EDITORIAL.—All editorial communications and matter must be addressed to the editor and not to individuals. Drawings or MSS or other material not considered suitable will be returned if stamps are enclosed, but the editor does not hold himself responsible for the safe keeping or safe return of anything submitted for his consideration. Payment for contributions will be made during the month following publication.

ADVERTISEMENTS.—Whilst every precaution is taken to ensure accurate printing, the publishers will not be responsible for printers' errors, or for errors arising out of telephonic instructions relating to advertisement copy, nor can they accept responsibility for the loss of or damage to advertisers' blocks left in their custody. Copy must be supplied without application from the publishers, and current copy and blocks will be repeated if new copy is not received at the time of closing for press. Orders for advertisements are subject to acceptance in writing from the Head Offices. Advertisement copy is subject to the approval of the publishers. All advertisements and contracts are accepted and made upon the express condition that the publishers have the absolute right to refuse to insert copy to which they may object for legal, public or trade reasons, which includes the right of rejection of advertisements, whole or part, containing cut prices of goods coming under an approved price-maintenance scheme, and such refusal of copy shall not be a good ground for advertisers to stop a current contract or to refuse to pay for the same, or for taking action for breach of contract. The publishers, whilst endeavouring to ensure that advertisements shall appear with all possible regularity, will not be held liable for any loss occasioned by the failure of any advertisement to appear from any cause whatever. The acceptance of an order does not confer the right to renew upon similar terms. Contracts relate to the advertisers' own goods or services, and the space may not be sub-let or disposed of in any way. Conditions which are contained in order forms other than those of the Proprietors and which do not conform to, or are in addition to, the Proprietors' conditions, will not be recognized as binding. Special conditions must be subject to mutual agreement.

SUBSCRIPTIONS AND SUPPLIES.—"Plastics" is obtainable to order from newsagents and bookstalls or by post from the publishers at an annual subscription rate of 34/- (Canada and U.S.A. $5.50), postage included. Shorter periods pro rata. Subscriptions are prepayable.

"Plastics" is obtainable from newsagents and bookstalls abroad through the following agents.—EUROPE—Messageries Dawson (S.A.), Paris; Messageries Hachette et Cie, Paris; W. H. Smith & Son, Paris and Brussels. U.S.A.—International News Co., New York. Canada—Wm. Dawson Subscription Service Ltd., Toronto, etc.; Gordon & Gotch, Ltd., Toronto. AFRICA—Central News Agency, Ltd., Cape Town; W. Dawson & Son (S.A.), Cape Town. ASIA—W. Thacker & Co., Ltd., P.O. 190, Bombay. AUSTRALIA and NEW ZEALAND—Gordon & Gotch (A'sia), Ltd.

REMITTANCES.—Postal orders, cheques, etc., should be made payable to TEMPLE PRESS LTD.

COMMUNICATIONS.—All orders, letters, and inquiries regarding advertisements, subscriptions, and other business matters should be addressed to the Manager, "Plastics," Bowling Green Lane, London, E.C.1.

Printed in England and Published Monthly by the Proprietors, TEMPLE PRESS LTD., BOWLING GREEN LANE, LONDON, E.C.1.

COME TO stay

Many a piece of attractive plastic ware owes its delicate tint to Blythe Permanent Colours. The operative word is 'permanent,' for the beautiful pastel shades which these colours can provide are here today, here tomorrow, here as long as the article lasts. Neither heat, light nor the most arduous conditions will affect the colour in any way.

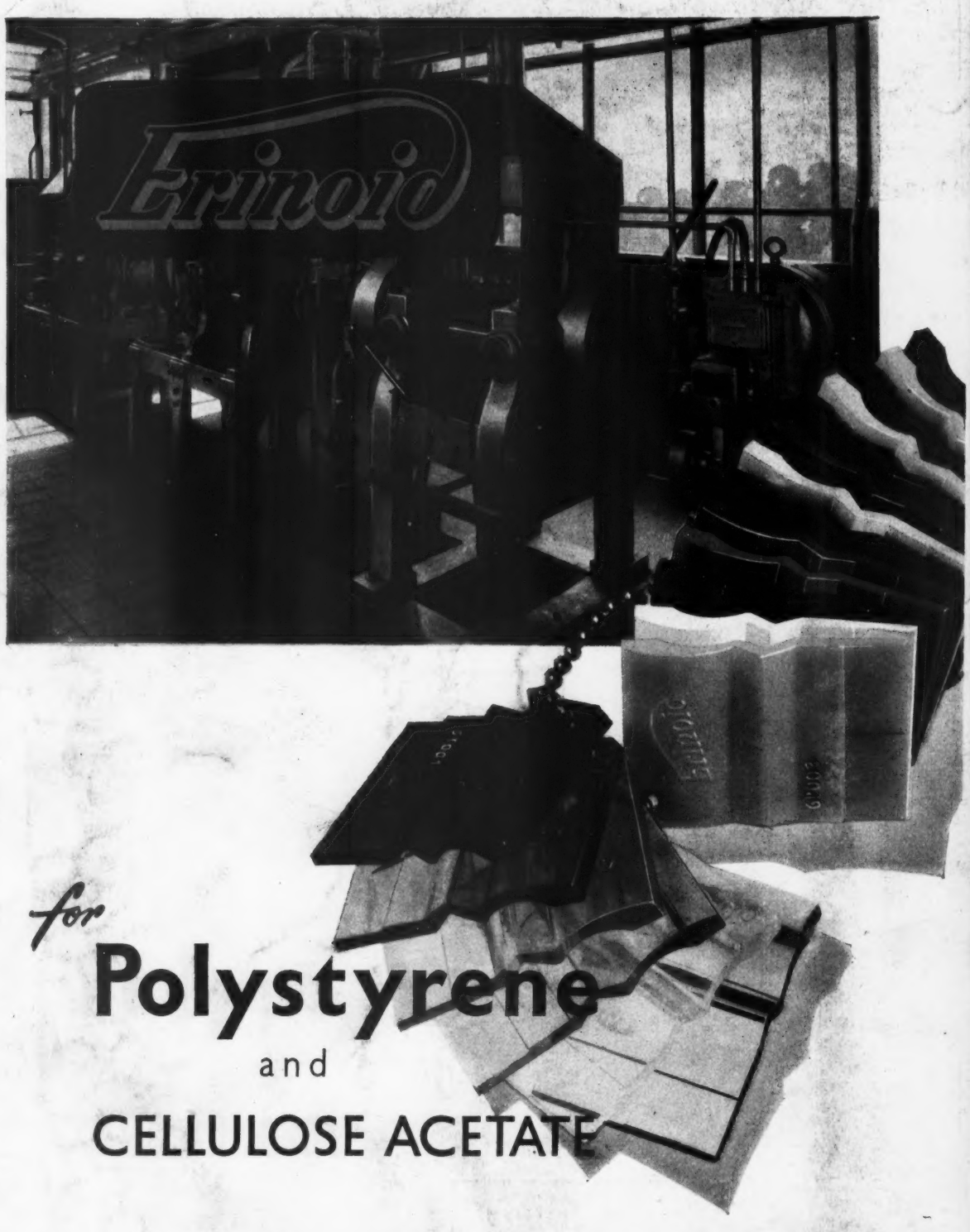
Whether used as pure colour or pastel shades, Blythe colours are *permanent*. Let us tell you more about them.

Blythe O U **WORKS LIMITED**

CRESSWELL · STOKE-ON-TRENT

—the home of the world's best colours

Vol. XVIII. No. 190. **Plastics** MAY, 1953



for

Polystyrene

and

CELLULOSE ACETATE

ERINOID LIMITED
STROUD GLOUCESTERSHIRE

Moulding Powders